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COMMUNICATIONS & TECHNOLOGY

SEPTEMBER 2004

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CQ

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- **CW Results: 2003 CQ World-Wide DX Contest, p. 14**
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W4AN

On the Cover: A key silenced...the world-class contesting QTH of Silent Key Bill Fisher, W4AN, Dahlonega, Georgia, just before it was scheduled to be dismantled. K1AR's reflections on page 87.

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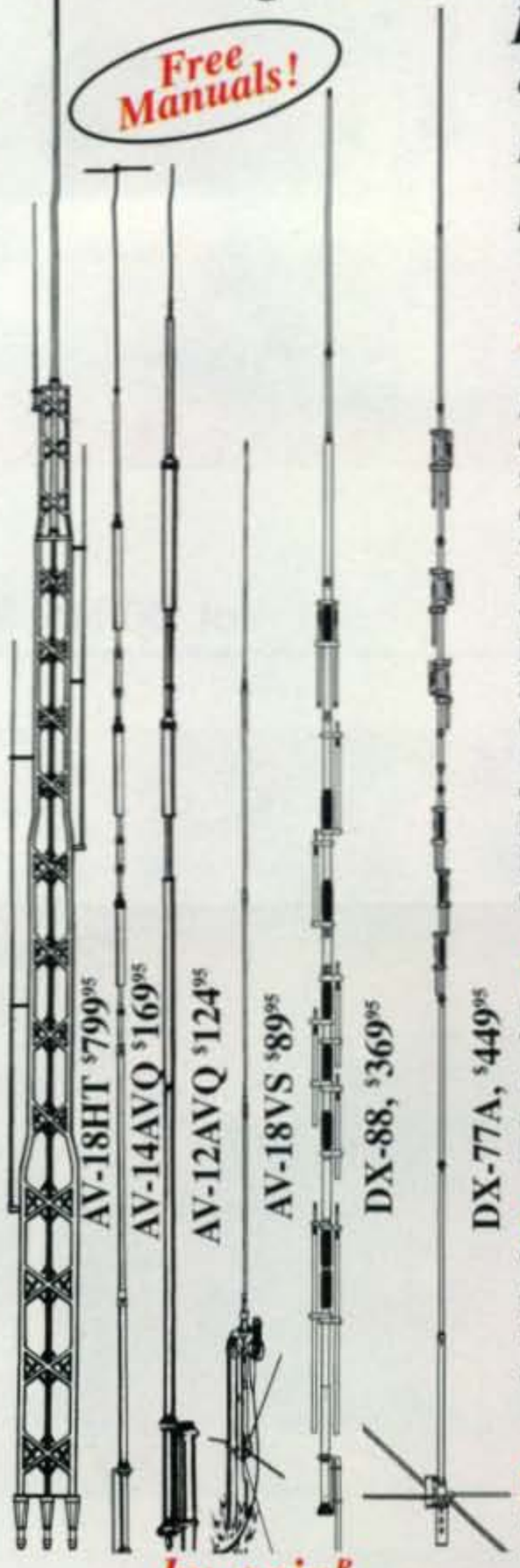

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AV-12AVQ	$134.95	10/15/20 M	1500 W PEP	13 feet	9 pounds	80 MPH	1.5-1.625"
AV-18VS	**$89.95**	**10 - 80 M**	**1500 W PEP**	**18 feet**	**4 pounds**	**80 MPH**	**1.5-1.625"**
DX-88	$369.95	10 - 40 M	1500 W PEP	25 feet	18 pounds	75 mph w/o guy	1.5-1.625"
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ham radio news

Hams' Complaints a Factor in Early End of Iowa BPL Test

On June 25, Alliant energy prematurely ended its test of broadband-over-power line (BPL) internet service in Cedar Rapids, Iowa. According to the *ARRL Letter*, the trial began March 30th and was supposed to continue until August or September. The ARRL filed a complaint on behalf of local radio amateurs who experienced HF interference during the test. Dan Hinz, Alliant Energy's BPL Project leader, stated that while the League's complaint was "certainly a factor" in the decision to end the BPL evaluation early, the primary reason was the fact that the utility had finished its testing ahead of schedule. The HF interference only ceased when the BPL system was deactivated. "Could the case against BPL deployment be any clearer?" asked ARRL CEO David Sumner, K1ZZ.

Powell Speaks in Support of BPL, Discusses Interference Risks

"The future is bright for power line broad band," FCC Chairman Michael Powell said in a July 15 speech in Menlo Park, California. According to the *ARRL Letter,* Powell expressed his belief that broadband-over-power line (BPL) internet service "holds the great promise to bring high-speed internet access to every power outlet in America." Powell also stated that the FCC will continue to "explore ways to support this technology while protecting other services from interference."

Separately, according to *Newsline,* Powell also discussed the compatibility of radio communications and ultra-wideband technology. In a taped message sent to a Boston meeting of the International Telecommunications Union, Powell is reported to have stressed the necessity of protecting other operators from UWB interference. UWB is a different technology from BPL.

ARRL to Set Up Member Lobbying Framework

The ARRL Board of Directors has approved a proposal to create a formal grassroots lobbying program among League members, with an initial focus on fighting Broadband over Power Lines (BPL). The board approved the creation of division- and state-level positions to help coordinate ARRL members' contacts with members of Congress. More information is available on the ARRL website at <www.arrl.org>.

In other actions, the League board also adopted a resolution encouraging the used of "Winlink 2000" as an emergency communications e-mail system. This recommendation by the ARRL's "ARESCOM" committee has been controversial, primarily due to the cost of equipment needed to operate the Winlink 2000 system. See last month's *CQ* "Public Service" column for a discussion of the pros and cons.

Andrea Hartlage, KG4IUM Newsline Young Ham of the Year

Fifteen-year-old Andrea Hartlage, KG4IUM, of Grayson, Georgia, has been named the Newsline Young Ham of the Year for 2004. Andrea holds an Extra Class license and has been a ham since 2000. She is the Youth Editor for the ARRL's web supplement to *QST* magazine, the Young Ladies' Radio League (YLRL) Youth Editor, and a member of the YLRL Board of Directors. She is also Georgia's ARRL Assistant Section Manager for Youth, and is a ham radio instructor at the Richards Middle School Amateur Radio Club. Andrea has developed games and other materials to help middle school students learn and understand the electronic theory needed for getting an amateur license.

The 19th annual Young Ham of the Year Award will be presented at the Huntsville (Alabama) Hamfest in mid-August. *CQ* is a co-sponsor of the Young Ham of the Year program.

Hawaiian Governor Blocks Ham Antenna Legislation

Hawaii's governor, Republican Linda Lingle, has vetoed two bills that would have given radio amateurs living under private deed covenants, conditions, and restrictions (CC&Rs) limited authorization to put up antennas. According to the *ARRL Letter,* one bill, designated HB 2773, would have allowed hams living in condos to arrange antenna mounting with the homeowners' association board without being required to alter standing CC&Rs. The other bill, HB 2774, would have given similar rights to the small number of hams living under CC&Rs on property zoned for farming. Both bills proposed that homeowners' association boards be required to provide an explanation in writing for denying permission to erect an antenna. In her July 13th veto of the two bills, Lingle said that "this measure would allow the installation of antennas in an owner's unit, notwithstanding objections by other owners," and that she disapproved of the bill "because it amounts to an inappropriate and unacceptable governmental intrusion into the contractual affairs of the property owners." ARRL Pacific Section Manager Kevin Bogan, AH6QO, called the final versions of the bills "a nudge toward reasonable accommodation" by homeowners' association boards and said that while the proposed pieces of legislation provided only a limited improvement in conditions for Hawaiian hams living under CC&Rs, they might have led to future gains.

AMSAT ECHO Satellite Launch a Success

AMSAT's newest amateur satellite successfully blasted into orbit from Kazakhstan's Baikonur Cosmodrome on June 29. According to the AMSAT News Service, the rocket carrying AMSAT-ECHO and several non-ham satellites lifted off on time, and all of the satellites later separated from the launch vehicle without incident. ECHO has since been activated and was renamed AMSAT-OSCAR 51. At press time, the satellite was still undergoing commissioning and was not yet ready for use by radio amateurs. Updates on availability of AO-51 for general use will be posted on AMSAT's website at <www.amsat.org>.

New Vanity Call Fee Effective August 6

The FCC's new ham radio vanity callsign fee of $20.80 took effect on August 6. The new fee represents a $4.50 increase over the previous fee of $16.30 for a ten-year period. Until the new fee is officially instituted on the chosen date, those seeking vanity calls will only be charged the $16.30 that is currently required with each custom callsign application. All applications received on or after August 6 must include the new fee. In Fiscal 2004, the FCC hopes to make $162,000 from vanity call application fees.

- News report by Dan Moseson

John Kraus, W8JK, SK

Astronomer and antenna designer John Kraus, W8JK, has become a Silent Key. According to a report on the ARRL website, Kraus died on July 18 at age 94. A member of the inaugural "class" of the CQ Amateur Radio Hall of Fame, Kraus was world-renowned as a radio astronomer and the father of the "Big Ear" radio telescope at Ohio State University. Among hams, he was perhaps best known as an antenna designer. His designs include the famous W8JK bi-directional wire beam as well as the helix and corner reflector antennas often used at UHF.

Additional and updated news is available on the Ham Radio News page of the CQ website at <http://www.cq-amateur-radio.com>. For breaking news stories, plus info on additional items of interest, sign up for CQ's free online newsletter service. Just click on "CQ Newsletter" on the home page of our website.

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Maldol MH-610 • Tri-band 2M/220/70cm HT Antenna
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Maldol NEW EX-510B/EX-510BNMO • Tri-band 6M/2M/70cm with fold-over
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VSWR • Length: 37" • Conn: PL-259 or NMO style • Max Power: 50W FM

COMET SB-15 • Tri-band 6M/2M/70cm with fold-over
• Gain & Wave: 52MHz 0dBi 1/4 wave • 146MHz 4.5 dBi 6/8 wave • 446MHz 7.2dBi
5/8 wave x 3 • Length: 58" • Conn: PL-259 • Max Pwr: 120W

NEW UHV-4 • Quad-band 10M/6M/2M/70cm with fold-over hinge
• Gain & Wave: 10M &6M 1/4 wave 2M 2.15dBi 1/2 wave 70cm 5.5dBi 5/8 wave x 2
• Length: 55" • Max Power: 10M 120W SSB 6M2M/70cm 100W FM • Conn: PL-259

COMET UHV-6 • HF/6M/2M/70cm Mobile Antenna *80/*20/*17/40/15/10/6/2M/70cm Mobile antenna with fold-over hinge
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zero bias - a CQ editorial

BY RICH MOSESON,* W2VU

A Day on the Beach

It's all too common these days to hear hams complain that "nobody's even heard of ham radio anymore," and that those who have heard of it consider amateur radio to be "archaic and outmoded." Well, I just got back from vacation, where I found further reinforcement of my long-standing belief that you really can't get too far from at least one person who at least knows someone who is a ham. Now this was a non-ham vacation, visiting with relatives, attending a family wedding and sneaking off for a few days of R&R on Ocracoke Island in North Carolina's Outer Banks. My only hamming opportunity was one afternoon, while my wife and kids were wandering the beach looking for shells and driftwood.

I'd brought with me the Altoids® tin CW transmitter that K4TWJ built for me about a year ago and a battery operated shortwave receiver, and I sat on a platform overlooking the beach, wearing headphones to block out the constant wind and tapping out CQs on the mini-key Dave included with the transmitter. I didn't make any contacts, but had fun and found it interesting to watch the reactions of people who walked past me, going to and from the beach. First, there were the two National Park Service maintenance workers, who gave me the once-over, then went about their business. I was sure that soon after they'd returned to their truck, I'd be getting a visit from a) a Park Ranger, b) a local Sheriff's deputy, c) the nearest FBI agent, or d) some combination of the above. Fortunately for me, it turned out to be e) none of the above.

In any event, the only person who did take notice was a woman who was dividing her time between her husband on the beach and her elderly (and somewhat confused) mother-in-law up on the platform with me. At one point when I took off my headphones to give my ears a little air, she said, "Excuse me, is that a ham radio?" Somewhat surprised that she got it right on the first guess, I responded, "Yes, it is. I'm trying to make some Morse Code contacts with this tiny transmitter. No luck so far, though." She replied, "My father does that. He was looking for something to do after he retired, so he got his ham radio license." When her husband came up from the beach and the three of them were leaving, I overheard him asking her, "Did you ask him what he was doing?" and she answered, "Yes, he's a ham." No further explanations needed.

So even on a beach on an island you can't drive to (except via ferry), you're never far from people who are at least somewhat familiar with what ham radio is about. What did surprise me, though, considering Ocracoke's remote location, was that in my wandering around Ocracoke village, I didn't see a single ham antenna. And when I got home, I checked the FCC database and there are only four hams listed with addresses on Ocracoke Island. You'd think there would be more, especially considering its vulnerability to storms.

By the way, for you folks who like to "activate" lighthouses, the Ocracoke light is visible from many parts of the village, so it shouldn't be too hard to put it on the air (the Amateur Radio Lighthouse Society requires only that you be within sight of a lighthouse for your operation to count as "activating" it). An IOTA (Islands on the Air) operation from there might be fun, too. Someday I'll have to return for a ham vacation!

On Target

The highlight of our visit to Ocracoke was a trip on an "outmoded and archaic" means of transportation ... just as amateur radio is seen by some as an "outmoded and archaic" means of communication ... a sunset sailing cruise on Pamlico Sound. Sailboats, like ham radio, are magical. You harness a part of nature, the wind, along with some pieces of cloth and the skill of the crew, to take you where you want to go. When you're lucky, and when the crew is skillful, you will travel far and fast.

Likewise, in ham radio, when you're lucky and the operator is skillful, a part of nature—the ionosphere—combined with some wire in the air, can take your signals all over the world.

*e-mail: <w2vu@cq-amateur-radio.com>

W2VU operates from the beach in North Carolina's Outer Banks. No contacts were made, except with a couple of beachgoers who turned out to be familiar with amateur radio. (Photo by Daniel Moseson)

There are more parallels, of course. For instance, just as ham radio will get through when more "modern" forms of communication fail, sailboats will get people from place to place even when more "modern" forms of transportation fail.

On our sailing trip, the captain encouraged the passengers, most of whom had no prior sailing experience, to help raise and lower the sails, and even to steer the boat from time to time. My kids jumped at both opportunities, and while they may or may not ever become sailors, they've been introduced to the joys of sailing and have a new appreciation for its value. We need to learn from our sailing friends how to better share the excitement we find in amateur radio.

I've recently been introduced to yet another "archaic and outmoded" activity, one that is growing in popularity, especially among young people. It may even be older than sailing. Archery. Certainly there are more modern and efficient ways of shooting things (as attested by the gun shop we passed in North Carolina offering machine gun lessons!), but archery maintains a certain appeal (spurred on, of course, by heroic archers in such movies as the "Lord of the Rings" trilogy). Organized archery has some interesting aspects from which, again, we can learn. For example, our local archery club meets in a public park where casual observers can wander by and discover it (kind of like Field Day once a week); there are instructors available for all, and all skill levels are accommodated, without more experienced archers making negative comments about newcomers or telling young people they're not welcome. A particularly interesting feature is that in clubs sanctioned by the National Archery Association, newcomers are welcome to come and have one lesson with no obligation (beyond the $10 fee), but if you want to come back, you first need to join the NAA (dues are similar to the ARRL). Now I'm not suggesting that ham clubs require newcomers to join the ARRL as a condition of attending more than one meeting or activity, but it is interesting that this requirement doesn't seem to stand in the way of very many people who want to move beyond an introductory lesson. And yes, you continue to pay $10 per lesson (with a discount for more than one archer per family), and that doesn't seem to stand in too many people's way, either. One difference between archery and ham radio is that the archery club provides all necessary equipment—bows, arrows, protective gear and targets—and people interested in learning archery get to shoot from the first lesson on. You don't have to wait weeks or months to get on the air, so to speak. Again, we can learn from this and encourage clubs offering licensing classes to have equipment on hand and include some operating time in every single lesson, starting with number one. After all, operating is what ham radio is all about.

If we want to help our hobby grow, and encourage more young people to get involved, we need to stop making excuses ("the big, bad internet is taking them away from us"), stop shooting ourselves in the foot ("no kids, no lids, no space cadets"; "go back to CB!"), and start making proactive efforts to be more visible, be more welcoming and keep our eyes on the target.

73, W2VU

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HAM IV and HAM V Rotator Specifications	
WindLoad capacity (inside tower)	15 square feet
Wind Load (w/mast adapter)	**7.5 square feet**
Turning Power (in lbs.)	800
Brake Power (in lbs.)	**5000**
Brake Construction	Electric Wedge
Bearing Assembly	**dual race/96 ball bearings**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight (lbs.)	26
Effective Moment (in tower)	**2800 ft/lbs.**

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TAILTWISTER Rotator Specifications	
Wind load capacity (inside tower)	20 square feet
Wind Load (w/ mast adapter)	**10 square feet**
Turning Power (in lbs.)	1000
Brake Power (in lbs.)	**9000**
Brake Construction	Electric Wedge
Bearing Assembly	**Triple race/138 ball brngs**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight (lbs.)	31
Effective Moment (in tower)	**3400 ft/lbs.**

CD-45II

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CD-45II Rotator Specifications	
Wind load capacity (inside tower)	8.5 square feet
Wind Load (w/ mast adapter)	**5.0 square feet**
Turning Power (in lbs.)	600
Brake Power (in lbs.)	**800**
Brake Construction	Disc Brake
Bearing Assembly	**Dual race/48 ball brings**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight (lbs.)	22
Effective Moment (in tower)	**1200 ft/lbs.**

HAM-V

HAM-V
$949.95
with DCU-1

For medium antenna arrays up to 15 square feet wind load area. Similar to the HAM IV, but includes *DCU-1 Pathfinder* digital control unit with gas plasma display. Provides automatic operation of brake and rotor, compatible with many logging/contest programs, 6 presets for beam headings, 1 degree accuracy, auto 8-second brake delay, 360 degree choice for center location, *more!*

ROTATOR OPTIONS

MSHD, $99.95. Heavy duty mast support for T2X, HAM-IV and HAM-V.
MSLD, $39.95. Light duty mast support for CD-45II and AR-40.
TSP-1, $34.95. Lower spacer plate for HAM-IV and HAM-V.

AR-40

AR-40
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For compact antenna arrays and large FM/TV up to 3.0 square feet wind load area. Dual 12 ball bearing race. Automatic position sensor never needs resetting. Fully automatic control -- just dial and touch for any desired location. Solid state, low voltage control, safe and silent operation. 2 1/16 inch maximum mast size. MSLD light duty lower mast support included.

AR-40 Rotator Specifications	
Wind load capacity (inside tower)	3.0 square feet
Wind Load (w/ mast adapter)	**1.5 square feet**
Turning Power (in lbs.)	350
Brake Power (in lbs.)	**450**
Brake Construction	Disc Brake
Bearing Assembly	**Dual race/12 ball bearings**
Mounting Hardware	Clamp plate/steel bolts
Control Cable Conductors	**5**
Shipping Weight (lbs.)	14
Effective Moment (in tower)	**300 ft/lbs.**

HDR-300A

HDR-300A
$1379.95

For ***king-sized*** antenna arrays up to 25 sq.ft. wind load area. Control cable connector, *new* hardened stainless steel output shaft, *new* North or South centered calibration, *new* ferrite beads on potentiometer wires reduce RF susceptibility, *new* longer output shaft keyway adds reliability. Heavy-duty self-centering steel clamp and hardware. Display accurate to 1°. Machined steel output.

HDR-300A Rotator Specifications	
Wind load capacity (inside tower)	25 square feet
Wind Load (w/ mast adapter)	**not applicable**
Turning Power (in lbs.)	5000
Brake Power (in lbs.)	**7500**
Brake Construction	solenoid operated locking
Bearing Assembly	**bronze sleeve w/rollers**
Mounting Hardware	stainless steel bolts
Control Cable Conductors	**7**
Shipping Weight (lbs.)	61
Effective Moment (in tower)	**5000 ft/lbs.**

Digital Automatic Controller

DCU-1
$649.95

Automatically controls T2X, HAM-IV, V rotators. 6 presets for favorite headings, 1 degree accuracy, 8-sec. brake delay, choice for center of rotation, crisp *plasma* display. Computer controlled with many logging/contest programs.

AR-35 Rotator/Controller

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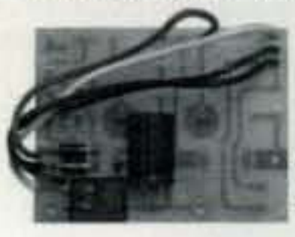

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announcements

• The following Special Event stations are scheduled to be on the air in September:

N2UL, from "CQ Labor Day," the Great Falls, Patterson, New Jersey; 1200-2200Z September 9 on 14.260 and 28.460 MHz. For certificate, send QSL and SASE to RDGULARA, c/o WA2VJA, 112 Prospect St., Nutley, NJ 07110-0716.

K5S, 100% solar power from Texas Renewable Energy Roundup and Green Living Fair, Fredericksburg, Texas; 1800Z September 23 to 1800Z September 26 *(no frequencies given)*. For certificate send 9×12 SASE with two units first-class postage to Greg Hall, KG5RJ, 18011 Old Preston Ct., Dallas, TX 75252.

W5HUM, from 100th anniversary of the Lum 'N Abner Museum and radio program, Pine Ridge, Arkansas; 1300–2000Z September 17 & 18 on 3.895, 7.235, 14.250, and 21.300 MHz. For QSL, send QSL and SASE to Ouachita ARA, 268 Polk 36, Hatfield, AR 71945.

W6A-W6O, from the 5th annual Route 66 On The Air, 15 clubs across the U.S. will participate; 0000Z September 4 through 2400Z September. For more information, go to: <www.qsl.net/w6jbt>.

W7J, from commemoration of the first Boy Scouts of America, Washington State Jamboree (WashJam), Tacoma, Washington; 2200Z September 3 through 1900Z September 6 on SSB 3.910, 7.260, 14.260 MHz (±20 kHz); CW 30–50 kHz above the bottom of the CW band on 80, 40, 20 meters; FM 2-meter repeater 147.28 103.5 PL; PSK-31 on 14.070 MHz. QSL with SASE to Radio Club of Tacoma, P.O. Box 11188, Tacoma, WA 98411.

KB8UUZ, from National POW/MIA Awareness Day, Freedom Twp., Ohio; 2100Z September 17 to 0200Z September 20 on 7.245, 14.235, 21.375, 28.375 MHz. For certificate send QSL and 9×12 SASE to Tom Parkinson, KB8UUZ, 9992 State Route 700, Mantua, OH 44255.

W8SWS, from Piqua Heritage Festival, Piqua, Ohio; 1400–2200Z September 4 on 14.240 and 7.240 MHz. For certificate send QSL and SASE to Susan Popp, 1411 Nicklin Ave., Piqua, OH 45356,

W9JOZ, from Hossier Valley Railroad Museum Open House, North Judson, Indiana; 1300–2100Z September 11 on 14.240 and 7.240 MHz. For QSL, send QSL and SASE to Starke County ARC, 405 W. Jackson St., Knox, IN 46534.

VC3HCR, from 50th anniversary of the Halton County Radial Railway Museum, Milton, Ontario, Canada; 1400–2000Z September 25 & 26 on 7.227, 14.240, 21.315, 28.480 MHz ±QRM. For certificate send QSL and SASE for Canadians, either two green stamps or 2 IRCs for all others, to MARC, c/o Michael Brickell, VE3TKI, 2801 Bucklepost Crescent, Mississauga, Ontario, Canada L5N 1X6 (on the web: <www.marc.on.ca>).

• The following hamfests, etc., are slated for September:

Sept. 4, **Uniontown ARC Gabfest**, club grounds, Old Pittsburgh Road (north of intersection of US Rt. 119 and PA Rt. 51), Uniontown, West Virginia. Contact Carl, WA3HQK, or Joyce, KA3CUT, 304-594-3779. (Talk-in 147.045+)

Sept. 11, **Grand Rapids Area Hamfest**, Forest Hills Northern Middle School, Grand Rapids, Michigan. Contact Jack Amelar, NY8D, e-mail: <grahamfest04@w8dc.org>, evenings 616-897-6885; <http://www.w8dc.org/swap.htm>. (Talk-in 147.26+ [94.8 Hz], 146.52 simplex; exams 10 AM)

Sept. 11, **Owen County Hamfest**, Owen County Fairgrounds, Spencer, Indiana. Contact Katie Smith, K9INU, 812-829-2140; or John Maasson, K9FK, 812-336-2311.

Sept. 11, **Saratoga County R.A.C.E.S. Hamfest**, Saratoga Springs, New York. For information go to: <www.wa2umx.net/hamfest%202004.htm>. (Exams)

Sept. 12, **Western Connecticut Hamfest**, Edmond Town Hall, Newtown, Connecticut. Contact Bill Schaefer, N1PJG, 63A Taylor Ave., Bethel, CT 06801 (203-798-2831). (Talk-in 147.300+, PL 100)

Sept. 12, **Butler Hamfest & Computer Show**, Butler Farm Show Grounds at Roe Airport, Butler, Pennsylvania. Contact dave Zibrat, W3VXT, e-mail: <w3vxt@arrl.net>, 724-282-9077; <http://www.qsl.net/w3udx>. (Talk-in 147.36+)

Sept. 18, **Rhode Island Amateur FM Repeater Service Fall Fleamarket & Auction**, VFW Post 6342, Forestdale, Rhode Island. Contact Rick Fairweather, K1KYI, e-mail: <k1kyi@arrl.net>, 401-725-7507 (7–8 PM only). (Talk-in 146.76)

Sept. 18, **W9DXCC Convention & Banquet**, Holiday Inn, Elk Grove Village, Illinois. Contact Bill Smith, W9VA, e-mail: <w9va@aol.com>, 847-945-1564. Details and registration form at: <www.w9dxcc.com>.

Sept. 18, **Radio Amateurs of Greater Syracuse Hamfest**, Pompey Hill Fire Dept., Syracuse, New York. For more information call 315-698-4558 or e-mail via the website: <www.ragsinreview.com>. (Talk-in 147.90/30; exams noon)

Sept. 18, **Hualapi Radio Club Hamfest**, Mohave Community College parking lot, Kingman, Arizona. Contact Bill Beaman, KAØIYS, 928-758-6780, cell 602-999-6004. (Talk-in 146.76, PL 131.8; exams)

Sept. 18–19, **Virginia Beach Hamfest**, Virginia Wesleyan College, Virginia Beach, Virginia. Contact Lynn Lilla, W9DJQ, 757-479-1597; e-mail: <hamfest@exis.net>; <www.vahamfest.com>.

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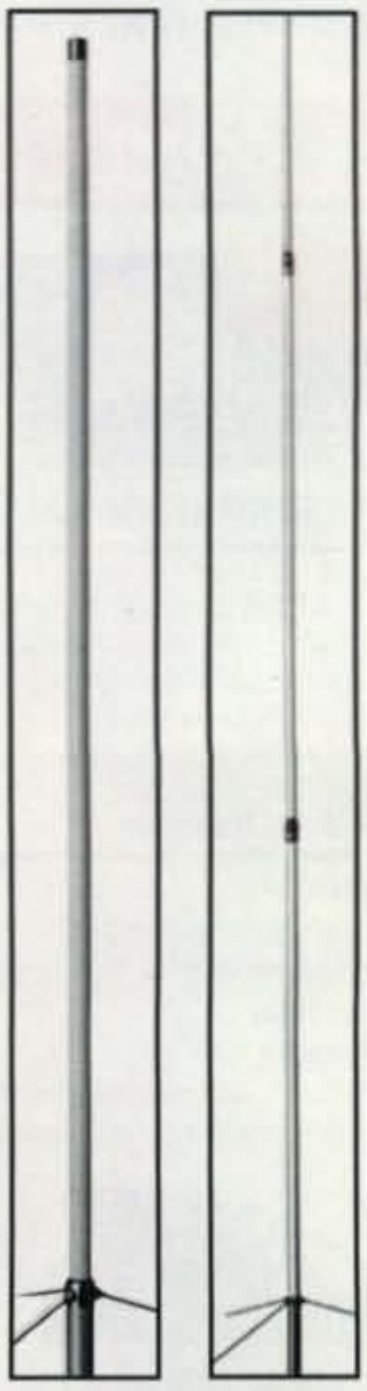

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X500HA (UHF-Conn.)
X500HNA (Type-N Conn.)
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- Wide frequency bandwidth
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Specifications:

Freq.: 2m: 144–148MHz
70cm: 440–450MHz
Power: 200 watts
Wind Rating: 135 MPH (no ice)
Height: 5.6 feet

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Power: 200 watts
Wind Rating: 90 MPH (no ice)
Height: 17.8 feet

DIAMOND Mono-Band Base/Repeater Antennas

MODEL	BAND (MHz)	WATTS	CONN.	HT. FT.	RATED WIND MPH (No. Ice)
CP22E [1]	144	200	UHF	9.0	70
DPGH62 [1]	50	200	UHF	21.0	78
F22A	144	200	UHF	10.5	112
F23A	144	200	UHF	15.0	90
F718A [2]	440	250	N	15.0	90
G200	2.4GHz	–	N	4.8	135

DIAMOND Dual-Band Base/Repeater Antennas

MODEL	BAND (MHz)	WATTS	CONN.	HT. FT.	RATED WIND MPH (No. Ice)
X50A	144/440	200	UHF	5.6	135
X50NA	144/440	200	N	5.6	135
X200A	144/440	200	UHF	8.3	112
X510NA [3]	144/440	200	N	17.2	90
X510MA	144/440	200	UHF	17.2	90
X500HNA	144/440	200	N	17.8	90+
X700HNA	144/440	200	N	24.0	90
U200	440/1240	100	N	5.9	135

DIAMOND Tri-Band Base/Repeater Antennas

MODEL	BAND (MHz)	WATTS	CONN.	HT. FT.	RATED WIND MPH (No. Ice)
V2000A [5]	52/144/440	150	UHF	8.3	110
X3200A [4]	146/222/440	100/200	UHF	10.5	112
X6000A	144/440/1240	100/60	N	10.5	112

Most requirement: 1.4"-2.4"

DIAMOND Yagi Antennas

MODEL	BAND (MHz)	WATTS (PEP)	CONN.	BOOM LNTH.	ELEMENT PHASING
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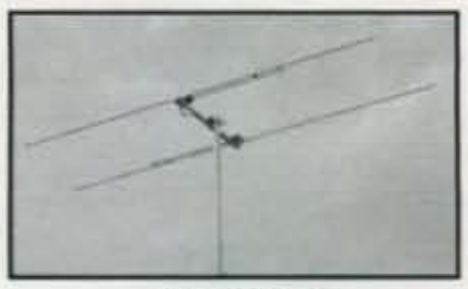
A504HB	50	400	UHF	10.7'	4 element
A144S5	144	100	UHF	37.5"	5 element
A430S10	432	100	UHF	43"	10 element
A430S15	432	100	UHF	89"	15 element



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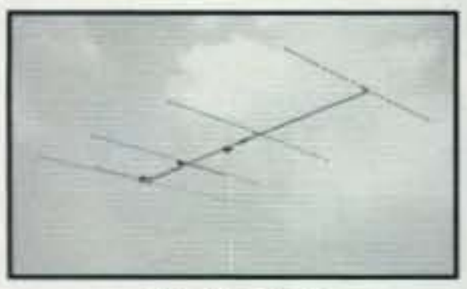

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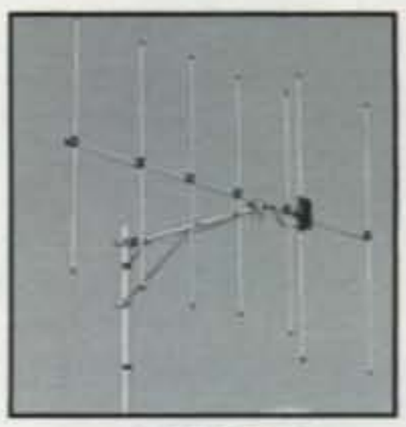

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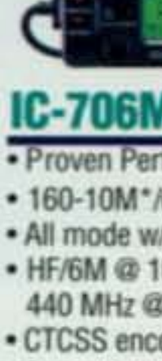

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If you think there aren't <u>any</u> young people coming into ham radio anymore, you're wrong. If you think there aren't <u>enough</u> young people coming into ham radio, join people such as KY1V and N9JA in doing something about it.

The Kids of Dayton

BY RICH MOSESON,* W2VU

Many of us talk about getting more kids involved in ham radio, and encouraging those young people with licenses to be active, but some of us go a step beyond and actually *do* something about it. I had the opportunity to talk with two of those people—and more importantly, with some of the kids they've influenced—at the 2004 Dayton Hamvention®.

Dayton's Ham of the Year for 2004 is David Kopacz, KY1V, who was honored for setting up a so-far unique program to provide a ham under age 21 with an expense-paid trip to a contest DXpedition, plus the opportunity to operate a major contest as part of a competitive team from an exotic location. (See box for this year's entry information.)

The young ham who got the opportunity last year to join the team—operating from the Turks and Caicos Islands during the 2003 CQ World-Wide DX Contest CW weekend—was 14-year-old Dan Bradke, W2AU (see photo 1). Dan told us his dad (John, W2GB) got him started in ham radio at age 11 when he (Dan) looked at some radio gear in a spare room and asked, "Does it work?" His father responded, "Get your license and find out."

Did you notice that the contest he participated in was a *CW* contest? Dan told *CQ* code is his favorite mode, explaining that "It's like a beat, (and) not a lot of people can understand it," adding, "Just being able to communicate with people using beeps and a wire antenna is amazing."

"I had an absolute blast down on North Caicos Island operating with the VP5X contest group," Dan said afterward. "David (KY1V) provided me with a once in a lifetime opportunity through his young contester program. I enjoyed being part of the team and have made new friendships as a result. I especially enjoyed meeting some of the other contesters in Dayton."

"I really hope that this young contester program takes off, and encourages younger hams to experience the world of contesting, and going on DXpeditions," he continued. "In this day and age, many kids rely upon the internet and the use of cell phones for communication. That's fine but there is something about being able to talk to someone in a far-off land by using Morse code. If other hams have the means to take a kid on a DXpedition, I would encourage them to do it!! This is one of the ways ham radio will continue to live on for many generations to come."

I talked with David and Dan while standing in front of the ICOM booth, where National Sales Manager Ray Novak, N9JA, pulled me over to two young people helping out and said, "C'mon, take their picture, too." Ray is another ham who's doing something about bringing more kids into ham radio and encouraging those we already have. He led the effort to produce a new ham radio comic book, *The*

**Editor, CQ*

Photo 1– Dayton 2004 Ham of the Year David Kopacz, KY1V, and 14-year-old Dan Bradke, W2AU, whom Kopacz sponsored on a contest DXpedition last fall to Turks & Caicos.

Photo 2– Trevor Conroy, W7DTC (17), and Sara Saeger, K3OOO (14), got a unique perspective on the Dayton Hamvention by helping out at the ICOM booth.

Young Ham DXpedition Opportunity

David Kopacz, KY1V, and the VP5X Contest Group are again planning to provide a lucky young ham with an all-expense-paid trip to a contest DXpedition on the Turks and Caicos Islands. The trip will coincide with the CQ World-Wide DX Contest SSB weekend in late October.

Candidates must be under 21, and have some contesting experience and their parents' written permission (parents may also attend, but at their own expense). "This is a gift to a young ham who has a passion for ham radio and contesting," says the group's announcement. "We are particularly looking for a young ham who has never been on any DXpedition and would not otherwise have the opportunity..."

Applications will be accepted until August 31. Candidates must submit an essay of at least 500 words, in English, describing how they got started in ham radio, who guided them through the process, and why they should be selected to join the group at VP5X. Complete details are available on the group's website at <http://www.vp5x.com>.

Adventures of Zack & Max (available on the web at <http://www.icomamerica.com/amateur/comic_book/>), and he gave 17-year-old Trevor Conroy, W7TDC, and 14-year-old Sara Saeger, K3OOO (photo 2), the opportunity to see the Hamvention from a "behind the scenes" perspective.

Trevor, who has an Extra Class license, was introduced to ham radio by his uncle, who's also a ham. Trevor lives in Newberg, Oregon, south of Portland. He enjoys contesting, operating HF, radio direction-finding (foxhunting), and building antennas. He says there are about four or five other young hams in his area with whom he talks regularly. Trevor will be attending Dowling College's School of Aviation in the fall. At the Hamvention, he was helping demonstrate two new ICOM radios.

Sara, who lives in Wind Gap, Pennsylvania, passed her code test at age 7, got her Novice license at age 8, and has been an Extra for about a year. She's mostly interested in contesting (as is her father, Rick Saeger, K3OO) and team contesting. Her job at Dayton was to run "Stump the Ham" competitions and promotional giveaways.

While I was interviewing Trevor and Sara, two other young hams came by. Eleven-year-old Rebekah Anne Dorff, WG4Y, of Hoover, Alabama (photo 3), is part of a multi-ham family. Her parents, Truman and Angela, are NN4C and WN4C, respectively, and her sister, Christal, is KG4WYN. Rebekah enjoys contesting and talking to people around the world. She organized a youth forum at the "Birminghamfest" in Birmingham, Alabama, and is very proud of being her sister's "Elmer." Rebekah is also Alabama's ARRL Assistant Section Manager for Youth. She's been a ham since age 8 and has been to Dayton four times.

Paul Chapman, KI4AYK (photo 4), waited til the ripe old age of 12 before getting his ham license. Now 13, he says, "Talking to people everywhere is a lot of fun. Everybody's different everywhere, so there's always a new personality to talk to." This was his first visit to the Hamvention and he thought it was "pretty cool that all these people are coming together with one interest."

Finally, I chatted with Jordan Klein, KC2GAE, and his father, Harvey, WS2Q. Jordan is 18, holds a Technician license, and has been a ham for four years, operating mostly on repeaters, along with some HF work with his dad. He'll be attending Penn State University this fall and plans to join the radio club there. What Jordan likes most about ham radio, he says, is "the ability to talk to anybody anytime, with no build-up time. Just pick up the radio and talk to people."

This random group of young hams represented many more who came to Dayton. We just didn't have the chance to speak with any other ham kids. The feeling of many of these young hams was wrapped up in Sara Saeger's advice for other young people considering getting their ham licenses: "Don't get frustrated. Once you pass, you have it for the rest of your life. It's a great hobby."

Photo 3– Eleven-year-old Rebekah Anne Dorff, WG4Y, was at her fourth Hamvention. At home in Alabama, she's ARRL Assistant Section Manager for Youth.

Photo 4– Paul Chapman, KI4AYK, is 13 and was enjoying his first visit to Dayton. He likes talking to people everywhere and notes that "everybody's different everywhere, so there's always a new personality to talk to."

Kids at Dallas, Too

There were plenty of kids on hand for the Dallas HamCom hamfest in June, as well, including a large contingent from a school participating in the ARRL's "Big Project" ham-radio-in-education program, and plenty of Scouts drawn in by a special event station operated by the Boy Scouts of America (headquartered near Dallas), K2BSA/5.

In addition, as noted last month, 12-year-old Megan McClellan was the first person to receive a "same-day callsign" (KE5BSZ) from the FCC, two hours after the W5YI/VEC electronically submitted two dozen successful test candidates' applications directly from the hamfest.

Hamfest organizers: Why not plan a special activity focused on young people, along the lines of the K2BSA operation at Hamcom or the annual Newsline Young Ham of the Year Award presentation at August's Huntsville Hamfest?

A group of Boy Scouts watches and listens as the official Scout ham station, K2BSA, operates from the HamCom hamfest in Dallas.

Twelve-year-old Megan McClellan, KE5BSZ (right), of Rockwall, Texas, poses with another "same-day licensed" ham, Linda Wheeler, KE5BTV, a new General from Lake Charles, Louisiana.

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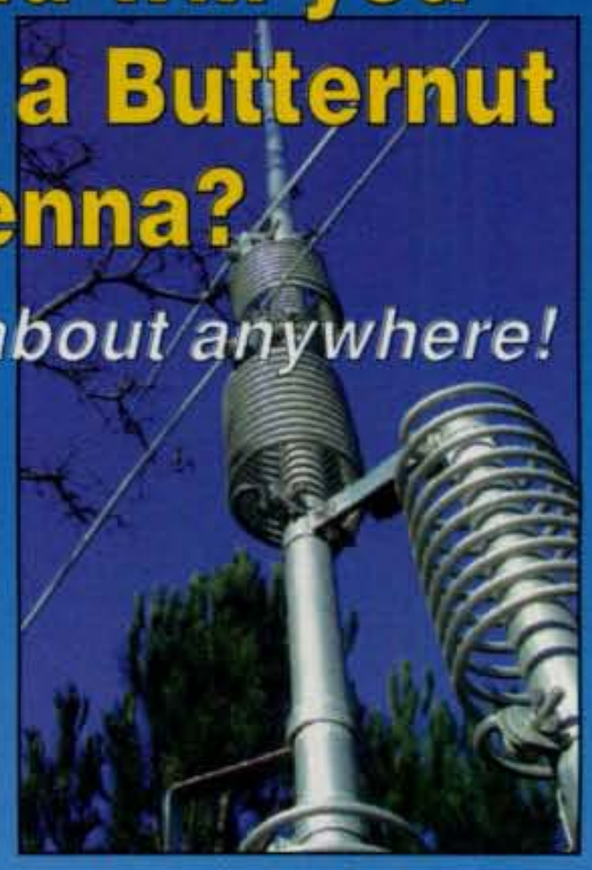

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Results of the 2003 CQ WW DX CW Contest

BY BOB COX,* K3EST

Expanded CQ WW Contest Results on the Web

We've moved a few elements of our contest reporting onto the CQ website again this year, including **Station Operators** of Multi-Op stations, and **Zone Leaders/Single Op**. In addition, we have expanded **QRM** on the web.

To view these additional and expanded elements of this year's CQ WW results, go to <http://www.cq-amateur-radio.com/cqwwhome.html>, then click on "Expanded results, 2003 CQ WW CW" and select the category you want to see. You may also get there by going to our home page at <http://www.cq-amateur-radio.com>, clicking on "Contest Rules & Info," then clicking on "CQ World Wide DX Contest" and selecting "Expanded Results, 2003 CQ WW CW."

After sorting through the 4109 CW and 4152 SSB logs that were received, the 2003 CQ WW DX contests can best be summarized by the word *fantastic!* Also, the number of electronic logs increased to 7761!

If the CQ WW CW is any indication, CW is alive and well, as the 4109 logs received sets a new all-time-high record. The CW conditions were outstanding. In the words of some of the entrants: "Thanks to the calm geomagnetic conditions, the entire contest was enjoyable"—*JJ1BDX/3.* "Wow! The best propagation in the last year—*4M7A.* "What an amazing contest. It just doesn't get any better than this"—*AK5X.*

Outstanding openings on 10, 15, and 20 meters made for lots of QSO opportunities for many people: "It was nice to look at the propagation report and see the *K*-index at 1 during a contest! Probably the best conditions for a contest weekend this fall"—*K8IR.* A large number of normally hard-to-find DX countries were the air for the contest and made for many new countries for lots of contesters. Everyone looked forward to the fun and setting personal records. Look in the scores listing for your call, and check out the various boxes to see how the top entrants performed.

High Power

The High Power, All Band category requires a very good plan. If you are going for the gold, you know that you will have to try your best for close to 48 hours straight! Not only that, but to be at the top, you have to be versatile in using two bands, running on one band while tuning a second band for multipliers. It takes practice.

The top three in the 2003 contest are all experts. The world top score went to multi-time champion Jose, CT1BOH, operating from P40E. Jose made over 8000 QSOs (averaging over 166 Q/hr)! Second place went to Al, 4L5A, operating from D4B on a mountaintop overlooking the ocean (see the SSB results last month for a photo of the QTH). Third place was won by Jeff, N5TJ, who operated from KP3Z.

Out in the Pacific, Mike, KH6ND, pushed KH7X to a new Oceania record. In Europe, Timo, OH1NOA, once again was the high scorer. He set a new European all-time record. Timo was followed by OK1RF and TM6X. In the U.S., the top honor went to Scott, W4PA, operating from NT1Y in northern Vermont. Just to the east was the second-place station of Doug, K1DG. Third place went to LZ4AX, who operated from central Pennsylvania and took K3CR to new heights. Special mention must be made of ZS4TX, EX9A, VK6AA, and VK4UC, all of whom turned in fantastic scores from a long way away from population centers.

The continental winners were: North America KP3Z, Africa D4B, Asia A45XR, Japan JH5FXP, Europe CT8T, Oceania KH7X, and South America P40E.

Low Power

"I've always hesitated to spend much time in the worldwide contests with just my li'l ol' 2-element quad at 40 feet, but I really had pretty good luck working S&P the whole time!"—*NØSXX.* "Thank you for very nice contest. I spent a wonderful radio ham weekend in the east-north Hungarian spa town Eger, running Yaesu FT987, monoband vertical dipole from third floor of the hotel Flora"—*HA/OK2WH.*

These two comments pinpoint what's best about the CQ WW—little pistols sharing in the fun. The category that has the greatest number of participants by far is Low Power. To win this category is not easy. Last year Tom, W2SC, keyed 8P5A to the top of the hill. He was followed by Jon, KL2A, who traveled to CT9M, and by AA3B at V26K. Other outstanding scorers in the top ten were SU9NC; 7X2ARA (op. DF4SA); and UA9AYA (op. Willy, UA9BA), with the top score in Asia. The outstanding efforts of Masa, JH4UYB, and VP8/LZ2UU also must be mentioned.

In the U.S., the top barefoot-power honor went to Uli, KK8I (DL2HBX), at K8CC. Uli was followed by N1UR and Terry, N4TZ/9. Over in Europe, Filipe, CT1ILT, reprised his SSB win by taking top honors as CQØT. Operating from the Iberian peninsula helps, but you also must have good skills. Second in Europe went to MU/DL2OBF and third to OK2PP.

The continental winners were: North America 8P5A, Africa CT9M, Asia UA9AYA, Japan JH4UYB, Europe CQØT, Oceania YBØECT, and South America PY2NA.

The KC1XX Multi-Multi team (left to right): Matt, KC1XX; Bill, W2RQ; Dave, KM3T; John, K1AR; John, W1FV; Dave, N3RD; Bill, K1GQ; Charlie, K1XX, and Sabrina (oldest daughter of KC1XX).

*e-mail: <k3est@cqww.com>

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QST, Product Review, July 2000

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Donor: Slovenia Contest Club

World QRPp
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World Assisted
3V8BB (Opr: Hrane Milosevic, YT1AD)
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USA
NT1Y (Opr: Scott Robbins, W4PA)
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Europe
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Europe – Low Power
CQØT (Opr: Filipe Monteiro Lopes, CT1ILT)
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Japan – Low Power
Masa Okano, JH4UYB
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South America
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FS5UQ (Opr: Larry Pace, N7DD)
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World – 14 MHz
D44TD (Opr: Luca Aliprandi, IK2NCJ)
Donor: W2JT Memorial (North Jersey DX Assn.)

World – 7 MHz
EA8EA (Opr: Ville Hiilesmaa, OH2MM)
Donor: Alex M. Kasevich, VP2MM

World – 3.5 MHz
Mauri Leppala, EA8/OH4NL
Donor: Fred Capossela, K6SSS

World – 1.8 MHz
EA8EW (Opr: Jaakko Silanto, OH1MA)
Donor: Kenneth Byers, Jr., K4TEA

USA – 28 MHz
Bill Tippett, W4ZV
Donor: Wireless Institute of the Northeast

USA – 21 MHz
Kenneth Wolff, K1EA
Donor: Wayne Carroll, W4MPY

USA – 14 MHz
Daniel Handa, W7WA
Donor: Northern Illinois DX Association

USA – 7 MHz
Philip Allardice, KT3Y
Donor: W6AM Memorial (Jan Perkins, N6AW)

USA – 3.5 MHz
Robye Lahlum, W1MK
Donor: Bill Feidt, NG3K

USA – 1.8 MHz
Lawrence Emery, K1UO
Donor: Kat Obermann Memorial
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Donor: Jay Pryor, K4OGG

Europe – 21 MHz
OH6AC (Opr: Jyrki Nieminen, OH6CS)
Donor: Robert Naumann, N5NJ

Europe – 14 MHz
Robert Cummings, GIØKOW
Donor: G3FXB Memorial (Maud Slater)

Europe – 7 MHz
Tine Brajnik, S50A
Donor: Ivo Pezer, 9A3A/5B4ADA

Europe – 3.5 MHz
OH2BH (Opr: Ilkka Korpela, OH1WZ)
Donor: K3VW Memorial (Frankford Radio Club)

Europe – 1.8 MHz
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Donor: Pat Barkey, N9RV & Terry Zivney, N4TZ

Japan – 21 MHz
Akito Nagi, JA5DQH
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K1KI (Oprs: K1CC, K1KI, KM1P, W1RM)
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Canada
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Donor: Eastern Canadian DX Association

Carib./C.A.
VP5X (Oprs: KY1V, OH3RB, OH9MM, W2AU, WA4PGM)
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CT8/OL8R (Oprs: OK1DX, OK1FCJ)
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AH2R (Oprs: JI3ERV/NH2C, JR7OMD/WI3O, JR8VSE/NH2N, JHØUSD/KH2VO)
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South America
LU7DW (Oprs: KD6WW, LU7DW, LW8EXF)
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CT9L (Oprs: DJ6QT, DL1EFD, DL1YD, IK2QEI, I2VXJ, SM2EKM, W8LU)
Donor: Ranko Boca, YT6A

U.S.A.
K4JA (Oprs: K4JA, K4MA, K4VV, K7SV, NY3A, W3BP, W4TNX)
Donor: Northern Neck Contest Club

Europe
RU1A (Oprs: RW1AC, RU1AA, RV1AW, RA1ACJ, RA1ARJ, RA1AIP, UA1ARX, UA1ACC)
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MULTI-OPERATOR, MULTI-TRANSMITTER
World
HC8N (Oprs: NØJK, N6RO, K5KA, N5KO, N5RZ, N6TR, AA4NC, K6AW, W6RGG, K9NW)
Donor: K2GL Memorial (Doug Zwiebel, KR2Q)

USA
KC1XX (Oprs: KC1XX, K1AR, K1GQ, K1XX, W1FV, W2RQ, KM3T, N3RD)
Donor: N6RJ Memorial (Bob Ferrero, W6RJ)

Europe
ZA1A (Oprs: DJ2YA, DL3DXX, DL6LAU, K3NA, OHØXX, OH2BH, OH2KI, OH2PM, OH2TA, OH2UA, WA6CDR, Z35M, ZA1B, ZA1D, ZA1E, ZA1Z)
Donor: Finnish Amateur Radio League

Japan
JA5BJC (Oprs: JA5BJC, JA5FDJ, JA5JCC, JH5FIS, JH5RXS, JR5JAQ, JR5VHU, JE1JKL, JM1UWB)
Donor: Ryozo Goto, JH3JYS

WORLD – SSB/CW COMBINED
PJ2T
Donor: WØID/WØUN ALPHA Award

U.S.A. – MULTI-MULTI SSB/CW COMBINED
KC1XX
Donor: N8SM Memorial (Operators of K3LR)

JAPAN – MULTI-SINGLE SSB/CW COMBINED
JA7YAA
Donor: Vienna Int'l Amateur Radio Club – 4U1VIC

CONTEST EXPEDITIONS
World Single Operator
7X2ARA (Opr: Cornelius Paul, DF4SA)
Donor: Yankee Clipper Contest Club

World Multi-Single
TO4WW (Oprs: F5CW, F5JKK, F5PTM)
Donor: Carl Cook, AI6V

World Multi-Multi – Jim Neiger, N6TJ Award
5U5Z (Oprs: GØMTN, G3XTT, G4BWP, G4PIQ, K5VT, KC7V, KY7M)
Donor: Alexander Teimurazov, 4L5A/D4B

SPECIAL – SINGLE OPERATOR AWARD
World SSB/CW Combined
D4B (Opr: Alexander Teimurazov, 4L5A)
Donor: Hrane Milosevic, YT1AD

World All Band: Under 21 years old
CQØT (Opr: Filipe Monteiro Lopes, CT1ILT)
Donor: Chuck Shinn, W7MAP

CLUB
World SSB/CW
Yankee Clipper Contest Club
(460,687,341)
Donor: W1WY Memorial (CQ magazine)

Non-USA SSB/CW
Rhein-Rühr DX Assn.
(265,980,959)
Donor: N6AUV Memorial
(Northern California Contest Club)

**Second place.*

B4RF op. David, BA4RF, Single Op, 7 MHz, High Power.

QRP

If you want to recapture your long-lost contesting skills, the QRP category can be the refresher course you need. Searching for QSOs, knowing when to call, and knowing when to move on are skills taught by being QRP.

The number one small signal was put out by Didier, FY5FY. He managed a whopping 3082 QSOs with 5 watts. Tom, N4KG, was the clear top North American scorer and #2 in the world, while third place world was taken by N8ET. Over in Europe the top score came from the far north, SM3C. He was followed by LY2FE and EU2MM. Special mention also must be made of the fine efforts of UA9SG, JR4DAH, W6JTI, and WØAH. They all had big scores.

The continental winners were: North America N4KG, Africa EA8BYM, Asia UA9SG, Japan JR4DAH, Europe SM3C, Oceania ZL2RVW, and South America FY5FY.

Assisted

The Assisted category means just what it says. You receive electronic spotting assistance from some source. There are lots of reasons to try the Assisted category. Here is one from N1AU that you may not have thought about: "My best CW performance ever in the CQ WW. At age 76, after several decades of contesting, I am unable to copy callsigns at 30 wpm on the first hearing, so my CQing is stressful and unproductive. But I have a secret weapon now! It is the Writelog band map and the Telnet DX spotting network. A click on a call in the band map tunes my radio and enters the callsign into Writelog. Then I verify the callsign accuracy, and send my call and exchange with function keys."

The top spot in the world went to Hrane, YT1AD, operating 3V8BB. He was followed by C4M and KI1G. In the U.S., first place went to KI1G, second place to W2UP/3, and third to K3WW. Over in Europe, the top scorer was DL6FBL, followed by YL8M and ON4UN. In the top ten was TA2ZF (formerly MØSDX), who is now making people happy from Turkey.

The continental winners were: North America KI1G, Africa 3V8BB, Asia C4M, Japan JH4IFF, Europe DL6FBL, Oceania VK1AA/4, and South America PQ2Q.

Multi-Single

It was a battle of two Asian powerhouses for first place in the hotly contested Multi-Single category, one located at the edge of Europe and the other 2000 miles to the southeast. Actually, three out of the top six world positions went to Asian stations.

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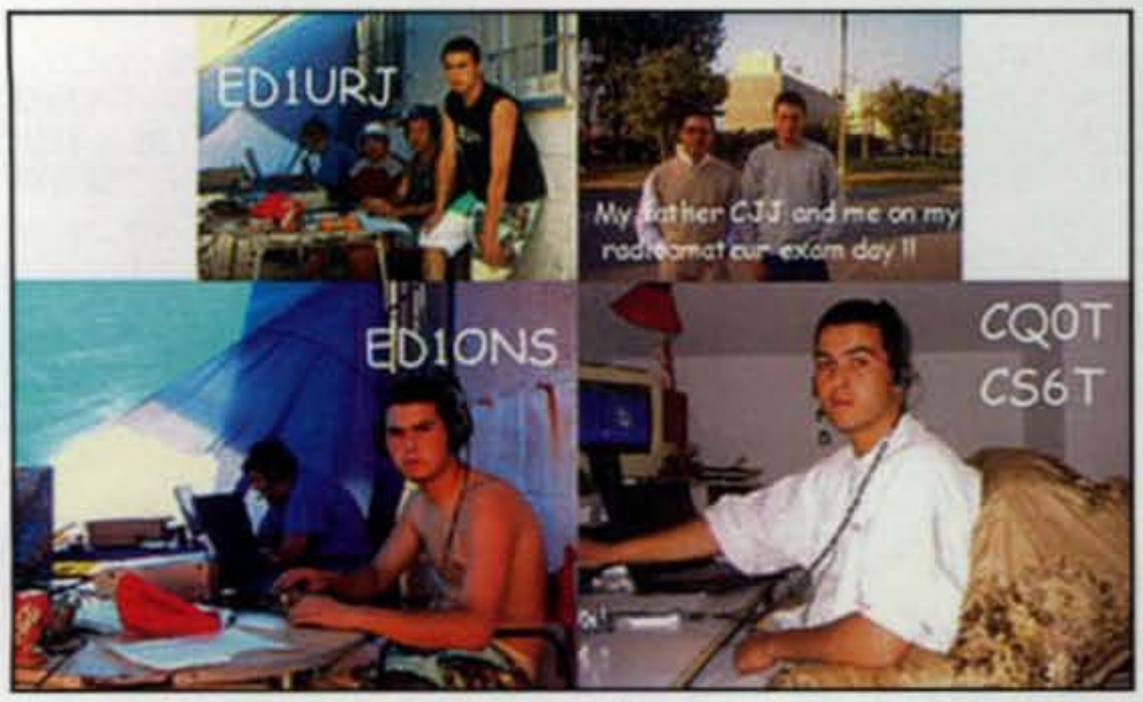
CLUB SCORES

USA Clubs

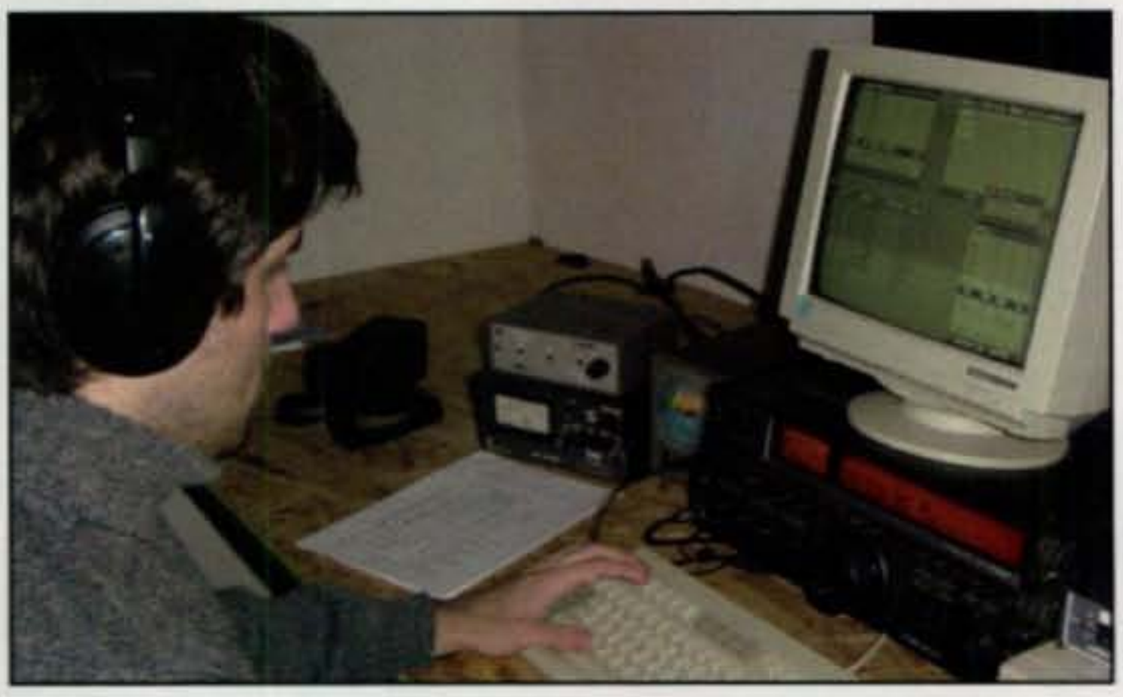
Yankee Clipper Contest Club (W1)	460,687,341
Frankford Radio Club (W3)	377,848,219
Potomac Valley Radio Club	185,945,522
Southern California Contest Club	77,917,452
Northern California Contest Club	64,777,519
North Coast Contesters (W3/8)	62,125,432
Society Midwest Contesters	59,144,734
North Texas Contest Club	53,141,960
Florida Contest Group	52,252,166
Minnesota Wireless Assn.	44,469,340
Florida Contest Club	43,307,629
Tennessee Contest Group	42,757,014
Mad River Contest Club	34,056,335
Central Arizona DX Assn.	29,636,557
Southwest Ohio DX Assn	27,826,034
Central Texas DX & Contest Club	21,065,876
Southeast Contest Club	20,695,788
Grand Mesa Contesters (WØ)	20,406,513
Carolina DX Association	15,383,214
Western Washington DX Club	14,910,702
Magnolia DX Assn. (W5)	13,605,745
Willamette Valley DX Club (W7)	6,969,749
Northern Illinois DX Assn	6,278,038
Kansas City DX Club	6,086,669
Texas DX Society	5,971,297
Rochester DX Assn (W2)	5,185,754
Empire Contest Club (W2)	4,342,471
Hudson Valley Contesters	3,513,137
Mother Lode DX&C Club (W6)	3,245,020
Spokane DX Assn	3,110,237
Eastern Iowa DX Assn.	2,898,020
Salt City DX Assn (W2)	2,612,406
Oklahoma DX Assn	1,722,748
Northern New York Contest Club	1,257,586
Sterling Park KARC (W4)	1,193,426
Southern California DX Club	1,141,693
Western New York DX Assn	1,107,676
WPKROP (W8)	907,696
Northern AZ DX Assn.	899,156
Akron Co. ARA (W8)	867,980
Northern Rockies DX Assn	687,156
Albermarle ARA (W4)	512,012
Metro DX Club	398,479
Loudoun ARG (W4)	335,243
Bergen ARA (W2)	291,929
Moultrie ARC (W9)	194,291
Lompoc DX Club (W6)	71,030

DX Clubs

Rhein-Rhur DX Assn	265,980,959
Bavarian Contest Club	235,257,769
Contest Club Finland	101,868,384
Contest Club Ontario	82,917,337
Slovenian Contest Club	72,219,521
Araucaria DX Group (PY)	70,008,019
Russian Contest Club	55,863,135
Croatian Contest Club	53,075,173
Chiltern DX Club (G)	51,467,784
Ural Contest Group (UA9)	38,779,922
Marconi Contest Club (I)	37,670,456
Tikirikki Contest Club (I)	35,730,065
Les Nouvelles DX (F)	30,288,451
Kaunas Technical University RC	29,212,198
UA2 Contest Club	28,664,433
HA DX Club	25,183,341
Aphrodite Contest Group (5B)	23,042,770
Bashkortostan DX Club (RA9W)	21,587,077
GM DX Group	19,669,683
Latvian Contest Club	19,561,200
YU Contest Club	18,454,320
Ukrainian Contest Club	17,996,590
Top of Europe Contesters (SM)	17,783,161
Sao Paulo Contest Group	17,392,330
GP DX Group (CT)	16,753,246
SP DX Club	16,514,805
TuPY DX Group (PY2)	16,006,383
North Scotland Contest Group	14,414,647
Bad Power (LU)	14,277,870
British Columbia DX Club	13,203,806
Tartu Contest Team (ES)	12,567,420
Lithuanian DX Group	12,537,492
Kiev Contest Group	12,133,723
Vrhnika Contesters (S5)	10,499,416
Beemster Contest Club (PA)	9,036,628
Sarejevo Contest Group (T9)	8,230,541
R.C. Rosario (LU)	7,890,721
Lowland Crazy Contesters (PA)	7,625,012
Israel ARC	7,318,951
Bloemfontein ARC (ZS)	6,966,948
Moscow Contest Club	6,651,145
Danish DX Club	6,531,941
Czech Contest Club	6,413,058
Contest Club Cambria (GW)	6,094,670
Kharkov ARC (UR)	5,978,941
YO DX Club	4,911,628
LU Contest Group	4,726,530
Belarus Contest Club	4,640,816
Central Siberian DX Club	4,357,447
Sky Contest Club (YU)	4,341,159
Aztec Contest Revolution (XE)	4,250,710
Kentucky Contest Group	3,669,223
Temirtau Contest Club (UN)	3,009,040
Guara DX Group (PY7)	2,909,965
Pizza & Pasta Contest Club(I)	2,827,350
Vojvodina Contest Club (YU7)	2,547,795
JT1KAA Club	2,491,118
Z30M Club	2,282,173
Amsterdam DX Club (PA)	2,249,679
Dozen dashes Contest Club (OM)	2,138,367
Yamal (UA9K)	2,052,824
Grupo Argentino CW	1,983,725
ZS6DDX Club	1,982,539
SP Contest Club	1,936,658
Fox Contest Club (YU)	1,900,223
KRYDXC (UA1O)	1,866,231
Uirapuru DX Club (PY8)	1,804,386
Radio Assn. Western Greece	1,632,432
UDXC (UR)	1,620,009
SDXG (DL)	1,551,882
Serpukhov RC (UA3)	1,471,312
ARC of Saipan	1,425,199
Banat DX Group (YU7)	1,292,176
Ferrara DX Team (I)	1,088,606
Northern Greece Contest Team	949,659
Pordenone Gangsters (I)	923,426
YO5KAD Club	900,220
FARS (UAØC)	896,869
North Patagonia DX Group (LU)	873,279
F6KAV Club	843,819
Belokranjec Club (S5)	835,940
Yaroslavl Club (UA3M)	801,030
Pushkino (UA3)	798,003
HS DX Assn.	738,997
KKKK (UA6A)	696,562
TA1KB Club	523,104
SVARK(SM)	499,640
Kaluga Radio Club (RA3X)	494,904
OM8A Club	404,412
Cocosolo Sibichi Club	361,784
Paper Dxers	345,668
SP9PKZ Club	333,510
Chofu Radio Amateur Club (JA)	316,493
Novio Magum Contest Group (PA)	301,630
SK6AW Club	299,480
South Jersey Radio Assn	298,894
SP OTC	293,629
Vladimir Radio Club (UA3)	253,112
Lynx DX Group (EA)	246,306
AR Chita Club (UAØU)	245,046
KVANT	240,642
KRK Angermoende E.V.	211,330
LA DX Group	175,828
KCM (JA)	153,853
Tallinn RC (ES)	134,922
G-QRP Club	129,535
R.C. Cordoba (LU)	87,141
Bangor & District ARS (GI)	67,586



In the 2003 CQWW CW, Filipe, CT1ILT, was the op at CQ0T, Single Op, All Band, Low Power, #1 Portugal, #7 World.



LT1F op Lucas, LU1FAM, Single Op, 28 MHz, High Power, made a good showing in the contest from Argentina.

Taking the MS crown was P3A. Second place was taken by A61AJ, and third was the high European score of EA6IB. Team EA6IB does a great job every year. The number one U.S. score came from Tom's team at K1KI. Next was perennial top scorer N3RS, followed by K1IR. The number two team in Europe was the OM7M super station, followed by TM2Y.

The continental winners were: North America K1KI, Africa CT3/OL8R, Asia P3A, Japan JA7YAA, Europe EA6IB, Oceania AH2R, and South America LU7DW.

Multi-Two

This new category continues to grow in popularity. It provides for most of the fun of MM but with a reasonable setup. Two stations going all the time is still tough to man if you want to try for the top. This time the top spot went to the RRDXA team at CT9L. What a fine job. Second place went to the contest consortium located on Curacao, PJ2T. Third place in the world went to the DXpedition of TS7N. They sure made it into a lot of logs! The top North American station was VE3EJ. In the U.S., Paul's team at K4JA put rural Virginia on the map for the #1 slot. Second place went to N3AD of the Frankford Radio Club, while third place went to Jack's team at N4RV. In Europe the top score came from the RU1A powerhouse. They are loud *and* they can hear. Second place went to 9A7A and third place to DL0CS.

The continental winners were: North America VE3EJ, Africa CT9L, Asia UP5G, Japan JA1ZLO, Europe RU1A, Oceania T32WW, and South America PJ2T.

Multi-Multi

Take a lot of work, a lot of planning, and people coming from all corners of the world and you have a multi-multi team. The Galapagos Isl. and zone 10 were once again put on the map by HC8N. This team is constantly changing, with new ops getting a chance to see what it is like at the other end of the pile-up. The Voodoo gang also continues their mission to work from all west African countries! This time they had a wonderful showing to take second place as 5U5Z. Third place was way down in southern Brazil at the hilltop location of PT5A.

The fight to Multi-Multi supremacy in the U.S. has grown into a friendly battle. Once again the KC1XX team took top honors. Tim's team in western Pennsylvania took K3LR to second place, just ahead of W3LPL. The top scorer west of Pennsylvania was the K9NS team.

The top score in Europe came from the special station ZA1A; what a nice surprise to find them *very* active on all bands. Second place went to 9A1A operating from their newly completed station on a mountain in northern Croatia. Finally, the gang at OH0Z put the Aland Is. multiplier into a lot of logs.

High on a mountaintop in central Shikoku, JA5BJC edged out their Nara competition, JA3YBK. In addition, everyone should give a big thanks to ZL6QH, whose efforts are really appreciated. If you worked zone 32 on all bands, it probably was them.

The continental winners were: North America KC1XX, Africa 5U5Z, Asia RZ9WXK, Japan JA5BJC, Europe ZA1A, Oceania ZL6QH, and South America HC8N.

Clubs

The club competition continues to grow. More clubs than ever have now joined in the fun. If you have not already done so, find out about your local contest club and join. You will have a great time. Your club participation can act as a window to worldwide contesting. Joining a club can get you caught up in going on a DXpedition. Just think what fun that would be!

This time the world's top club was the Yankee Clipper Contest Club, winning by 80-million+ points, with a total of over 460-million points. Second place went to the Frankford Radio Club with 377M points, followed by the Potomac Valley Radio Club. The three East Coast mega-clubs had a total of over 1-billion points!

The winner of the top DX club trophy was the Rhein-Rühr DX Association with a total of 265M points, followed by the friendly rival Bavarian Contest Club with 235M points and Contest Club Finland with 101M points. There was great organization and activity from the world's contest clubs. Everyone appreciates their efforts.

Team Contesting

Get five contesters together from anywhere in the world, form a team, and get on the air. That's all you have to do for Team Contesting. Why not try it? If you belong to a club, try inter-club competition. You might be surprised at how much fun you will have. This time team contesting was well represented by 24 teams (teams reflect only those who submitted scores):

1. Neiger's Tigers #1: N6TJ (ZD8Z), CN2RJ (W7EJ), CT1BOH (P40E), KH6ND (KH7X), D4B (4L5A)—56,282,996 points.
2. YCCC CW Alpha: NN1N, W1KM, K1XM (VP9I), W1WEF, KT1V—26,046,223.
3. Wons and Toos: K1DG, K1TO, N2NT (VY2ZM), N2IC (N7RT)—24,466,152.
4. Royal Bavarian Contest Team: DF2SA (7X2ARA), DJ5MW, DK3GI, DL1IAO, DL6FBL—21,676,410.
5. For Fives: N5TJ (KP3Z), K5GN, K5ZD—21,563,679.
6. CCF Team Sauna: OH1NOA (CT8T), OH1MDR (OH1F), OH4RH, OH6NIO, OH6OS—19,501,562.
7. YCCC CW Golf: K1NQ, KE1FO, KI1G, KT1V—16,454,672.
8. YCCC CW Bravo: WC1M, W2WB, N1DG, K5MA, N1UR—15,231,684.
9. WWYC – Lids United: CQ0T, TK9A, OZ1AA, OT3R, DX0M—14,941,988.
10. Have CW, Will Contest: K1NT, N5KA, VE1OP, ZS1EL, ZS4TX—11,452,035.
11. Cinco de Guyo's: K5NA, K5PI (W5KFT), N5AW, N3BB/5, K5IID/8—11,006,518.
12. WWYC – League of Notorious Lids: YT7AW, ON5ZO, N4YDU, K3OO—10,642,569.
13. YCCC CW Hotel: NB1B (VE1JF), W1JQ, WA1S—9,833,705.
14. YCCC CW Charlie: KS1J, W1TO, K1HT, W1CSM, W1EQ—8,416,093.
15. YCCC CW Delta: W1TE, W1RZF, WA1Z, K1RV, W1EBI—6,648,757.
16. YCCC CW Echo: K1LD, K1EP, W1HR, N3KCJ, KG1E—4,712,287.
17. CCF Team Terva: OH2MM (EA8EA), OH1WZ (OH2BH), OH3WW, OH6CS (OH6AC)—3,746,384.
18. CCF Team Sibelius: EA8/OH4NL, OH6YF (OH6Y)—2,832,114.
19. CCF Team Sisu: OH1MM, OH2LU, OH5DX, OH6KXL—2,346,003.
20. Central AZ DX Assn. Contesters: K8IA, K7XZ, W8AEF—2,250,500.
21. WWYC – Splatters: LY7Z, M4K, LT1F—2,136,202.
22. WWYC – Last Minute: LZ4UU, LY9Y—1,762,955.
23. YCCC CW Foxtrot: K1JN, K1MZ, KY1B, W6FC/1, W1DAD—1,451,849.
24. WWYC – Mushrooms: OE8CIQ, K8GU, JF3EBO—607,018.

Special Mention

"I escaped into Africa just to enjoy the feeling to be chased!"—*9G5ZZ (DL1CW)*. "The CQ WW CW is the best CW contest by far. More DXpeditions, more great operators, more super-stations, and much more to work! Was

QRV for 45 hours; three hours had to be spent fixing antenna problems on Saturday afternoon. CQ WW CW did its usual magic with the sunspots, too!"—*G3TXF*.

Each year hundreds of contesters take planes, boats, cars, or trains to destinations that are more interesting than the home QTH. These travelers make the contest much more interesting for all of us. Here are some of the stations that probably made it into your log: V26K, 8P5A, VP9I, VP9/K9CC, VY2ZM, VY2TT, ZF2AM, J38AA, 6Y5/K2KW, 6Y9A, 6Y0A, FM/T93Y, TO6M, KP3Z, FS5UQ, KP2/OK1TN, KP2/N4EXA, IH9P, 7X2ARA, ZD8Z, EA8ZS, EA8EW, D4B, D44TD, 9G5ZZ, 5X1X, EX9A, HZ1AB, BW2/JH0KHR, BW4/UA3VCS, BX3/DJ3KR, UK/JI2MED, TK9A, J45KLN, SV5RDS, MU/DL2OBF, GJ2A, MJ0ASP, LX/G3VQO, ER0ND, CT8T, GZ7V, VK4UC, VK9CJ, 9M8YY, 4W3CW, YE0X, FK8KAB, ZL/W1CU, ZL/W3SE, KH0P, WH0V, A35RK, DX0M, P40E, P40TA, P40R, P40K, VP8/LZ2UU, PX0F, PJ4M, 4M5X, ZF2NT, 3V8BB, C4M, 4U1ITU, 4U1UN, V26DX, 6Y6X, VP5X, TO4WW, CT3/OL8R, TA3/DK3KD, P3A, A61AJ, DS0DX, XV2NA, 9M4JB, EA6IB, AH2R, TI5N, V47KP, CT9L, TS7N, T32WW, PJ2T, 5U5Z, OH0Z, ZA1A, and HC8N.

New All-Time Records

Each year top competitors go after the ultimate—a new all-time continental record. Here are the new CW record holders.

TOP SCORES

WORLD

All Band

P40E	15,943,070
D4B	14,226,301
KP3Z	11,440,230
A45XR	10,837,434
P3F	10,267,632
VE2IM	10,053,072
ZD8Z	9,793,390
VY2ZM	9,763,140
KH7X	7,673,314
CT8T	7,613,600

28 MHz

LQ7D	1,365,860
PX2W	1,213,924
LT1F	1,138,956
LU5FC	920,736
W4ZV	664,092
WH2A	635,628

21 MHz

FS5UQ	1,355,345
P40TA	1,289,475
CX7CO	1,150,620
HZ1AB	966,095
K1EA	859,204
OH6AC	850,510

14 MHz

D44TD	1,748,937
P40R	1,493,316
4M5X	1,380,690
ZF2AM	1,368,696
H2G	1,194,620
GI0KOW	921,400

7 MHz

EA8EA	1,877,050
IH9P	1,425,304
PX0F	1,055,250
S50A	955,719
F6ARC	931,552
YT7A	810,017

3.5 MHz

EA8/OH4NL	784,254
OH2BH	403,662
EY8MM	376,406
S50C	356,130
ER0ND	345,276
YU7AV	338,259

1.8 MHz

EA8EW	178,480
4X3A	156,045
FM5GU	138,736
SP3BQ	136,250
LY3UM	108,780
S50U	95,570

Low Power
All Band

8P5A	8,859,500
CT9M	8,232,590
V26K	8,212,275
SU9NC	6,656,572
VP9I	5,854,420
FM/T93Y	5,703,100
CQ0T	5,174,184
7X2ARA	4,932,414
HI3K	4,522,500
UA9AYA	4,501,200

28 MHz

LU5FF	600,608
LW1EXU	506,466
LW7DX	433,608
LW8DQ	426,162
XQ4ZW	382,360
V31LZ	404,690

21 MHz

6Y9A	969,088
CW4A	863,282
EA8FT	716,254
KP2/N4EXA	583,552
LW9EOC	466,238
HG8I	442,156

14 MHz

CU2F	781,600
9G5ZZ	717,948
PY2NY	501,512
S57Z	374,085
J43J	369,045
LZ2TU	353,913

7 MHz

OK1FFU	380,912
TA3DD	379,776
M4K	357,022
Z31GX	344,760
4N1FG	334,592
YO3ND	312,450

3.5 MHz

6Y8A	382,568
RN9AA	152,768
S53F	117,484
LY1DT	113,100
SO9N	106,344
9A5ABO	104,878

1.8 MHz

DL1LH	68,541
LY5A	66,744
YT1R	51,300
4N7ZZ	33,480
SP2FWC	28,800
UT1FA	28,121

QRP, All Band

FY5FY	3,862,527
N4KG	1,166,832
N8ET	947,232
SM3C	865,293
UA9SG	767,151
N1TM	762,777
LY2FE	716,046
RA9SO	653,910
EU2MM	648,698
JR4DAH	634,092

Assisted, All Band

3V8BB	10,992,800
C4M	10,380,444
KI1G	8,310,372
W2UP/3	7,740,825
WP2Z	7,083,960
TA2ZF	6,650,040
K3WW	6,453,570
ZF2NT	6,393,842
RG9A	6,226,400
DL6FBL	6,092,800

Multi-Op, Single Trans

P3A	18,944,576
A61AJ	16,407,793
EA6IB	11,016,387
K1KI	9,893,408
RT9W	9,366,175
OM7M	9,326,068

Multi-Op, Two Trans

CT9L	24,874,181
PJ2T	24,843,554
TS7N	20,952,297
RU1A	16,533,164
VE3EJ	14,545,882
K4JA	13,644,240

Multi-Op, Multi-Trans

HC8N	42,781,344
5U5Z	36,288,373
PT5A	24,959,740
KC1XX	23,164,636
ZA1A	21,063,690
9A1A	20,841,912

USA

All Band

NT1Y/4	6,797,675
K1DG	6,407,730
K3CR	5,999,752
W1KM	5,758,782
K5ZD/1	5,665,749
KT1V	5,616,416
N2LT	5,585,356
K3ZO	5,382,828
W1WEF	5,342,400
W9RE	4,949,780

28 MHz

W4ZV	664,092
K5RX	507,072
N4GN	437,044
K9OM/4	429,266
K2NJ	341,341
W9XT	330,900

21 MHz

K1EA	859,204
N2MF	706,119
AD5Q	473,838
K4OAQ	470,658
W1MD/4	402,500
K2BA/5	381,304

14 MHz

W7WA	621,075
K1NT/5	257,972
N7WA	238,815
N6HR/7	182,676
N6MZ/7	149,058
K1QS	126,360

7 MHz

KT3Y	743,314
W5UN	508,886
N9JF/0	270,355
N5OT	223,938
NF6S	191,662
N8II	171,810

3.5 MHz

W1MK	332,860
N4CC	97,519
N2GC	92,763
K4DLJ	55,284
W0UO/5	38,930
K8MD	30,504

1.8 MHz

K1UO	23,332
N5JB	7,448
W8UVZ	7,102
W4SVO	1,912
W5MJ	819
W2VO	780

Low Power
All Band

K8CC	3,019,803
N1UR	2,509,460
N4TZ/9	2,467,941
KS1J	2,326,620
N5AW	2,142,623
N4YDU	1,932,984
W3EF	1,904,352
K2PS	1,875,384
W1TE	1,837,618
K4GKD	1,682,681

28 MHz

K4WI	233,883
W1END	97,344
N6RV	77,486
K9WA	67,716
K4RDU/0	58,320
W5OT	37,980

21 MHz

N4MO	245,057
WB4TDH	224,190
K2MFY	203,616
N5DO	201,576
K8IR	172,368
W9ILY	155,574

14 MHz

N0NR	182,376
W9AU	139,725
K9AW/4	70,312
W8UMR	53,865
AA1M	33,108
K1VSJ	16,450

7 MHz

W1MU	295,212
N2EE	252,702
WA1FCN	84,842
K2RR/4	50,589
K9WJU	30,816
NA3M	23,436

3.5 MHz

N2TA	52,922
W2TO	26,696
K2LP/1	8,280
NE0P/5	680
N9WI	112

1.8 MHz

NA4W	1,904
W7DRA	270
K6MI	42

QRP, All Band

N4KG	1,166,832
N8ET	947,232
N1TM	762,777
N9CIQ	541,940
W6JTI	498,106
W0AH	458,626
K8ZT	419,688
W7RAB	379,680
NU4B	212,173
W8VE	193,192

Assisted, All Band

KI1G	8,310,372
W2UP/3	7,740,825
K3WW	6,453,570
K2NG	5,163,202
K3OO	5,152,256
N2MM	3,941,552
K5KG/4	3,657,040
NA2U	3,531,250
W2WB	3,455,650
K3PH	3,311,016

Multi-Op, Single Trans

K1KI	9,893,408
N3RS	8,839,530
K1IR	8,122,368
K8AZ	7,510,536
W1US	6,418,215
N0FW/8	3,374,629

Multi-Op, Two Trans

K4JA	13,644,240
N3AD	8,983,955
N4RV	8,260,674
N0NI	7,233,908
N4WW	6,801,056
K0TV/1	6,756,848

Multi-Op, Multi-Trans

KC1XX	23,164,636
K3LR	19,848,015
W3LPL	18,887,778
K9NS	17,067,984
K7GM/4	13,885,675
K1TTT	13,334,020

EUROPE

All Band

CT8T	7,613,600
OK1RF	6,547,595
TM6X	5,295,600
TK9A	5,253,822
YT1AD	5,171,952
MW5A	4,790,079
OH1F	4,596,123
G3TXF	4,502,342
S57DX	4,370,912
DJ5MW	4,314,708

28 MHz

IT9BLB	431,802
T94NO	398,250
S52QM	379,469
F5RZJ	362,368
SP9W	307,314
F5IJT	303,576

21 MHz

OH6AC	850,510
OE4A	678,640
OH3WW	615,162
YZ1AU	582,562
YP3A	557,375
SM5INC	543,519

14 MHz

GI0KOW	921,400
LY2IJ	884,260
RT0Q	851,936
SN7Q	827,680
S58A	818,802
M7Z	783,188

7 MHz

S50A	955,719
F6ARC	931,552
YT7A	810,017
T96Q	803,544
HA3MQ	714,951
LY7Z	640,224

3.5 MHz

OH2BH	403,662
S50C	356,130
ER0ND	345,276
YU7AV	338,259
LY9Y	290,371
DL7ON	284,900

1.8 MHz

SP3BQ	136,250
LY3UM	108,780
S50U	95,570
GU4YOX	92,520
ON4WW	89,280
EU6EU	83,130

Low Power
All Band

CQ0T	5,174,184
MU/DL2OBF	3,905,720
OK2PP	2,967,016
4N7M	2,766,495
EA7RM	2,753,974
LY2MW	2,749,936
S52A	2,715,625
YO3APJ	2,653,675
UA4FER	2,487,706
OH4R	2,339,337

28 MHz

9A3VM	255,018
LZ1NG	224,664
ER3DX	165,230
SP3LWP	140,115
DK3LT	131,316
OK2HZ	123,057

21 MHz

HG8I	442,156
9A7D	324,714
HA3NU	322,478
SV2BOH	296,070
RV3ACA	282,532
EW2AA	255,996

14 MHz

CU2F	781,600
S57Z	374,085
J43J	369,045
LZ2TU	353,913
OH5TS	286,416
T94FC	252,450

7 MHz

OK1FFU	380,912
M4K	357,022
Z31GX	344,760
4N1FG	334,592
YO3ND	312,450
S54A	278,160

3.5 MHz

S53F	117,484
LY1DT	113,100
SO9N	106,344
9A5ABO	104,878
S58J	100,004
HA8FW	93,390

1.8 MHz

DL1LH	68,541
LY5A	66,744
YT1R	51,300
4N7ZZ	33,480
SP2FWC	28,800
UT1FA	28,121

QRP, All Band

SM3C	865,293
LY2FE	716,046
EU2MM	648,698
YU1LM	597,720
S52P	551,601
OH5BM	489,724
GW4ALG	486,595
G0DCK	471,801
OK1VBA	457,996
G3YMC	448,655

Assisted, All Band

DL6FBL	6,092,800
YL8M	5,322,744
ON4UN	4,805,560
DL1IAO	4,659,020
S52ZW	4,508,416
UR6QA	4,430,400
DF3CB	4,226,052
OH6NIO	3,969,010
DK3GI	3,544,216
SN8F	3,129,329

Multi-Op, Single Trans

EA6IB	11,016,387
OM7M	9,326,068
TM2Y	9,250,239
IR4X	9,243,954
DJ4AX	9,009,504
OK5W	8,894,880

Multi-Op, Two Trans

RU1A	16,533,164
9A7A	13,486,218
DL0CS	9,498,178
HG6N	9,304,300
DJ5IW	9,275,748
OT3L	8,208,200

Multi-Op, Multi-Trans

ZA1A	21,063,690
9A1A	20,841,912
OH0Z	20,411,160
DF0HQ	19,013,850
RW2F	17,720,640
GM5A	14,179,513

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BAND-BY-BAND BREAKDOWN—TOP ALL BAND SCORES

Number groups indicate: QSOs/Zones/Countries on each band

WORLD TOP SINGLE OPERATOR ALL BAND

Station	160	80	40	20	15	10
P40E	343/15/48	705/25/83	1683/30/100	1419/33/102	1794/33/111	1884/33/102
D4B	236/22/73	324/27/74	930/34/89	1532/36/107	1604/35/108	2267/35/117
KP3Z	236/16/47	441/22/80	1502/32/96	1332/37/105	1271/34/107	1893/33/101
A45XR	137/11/43	351/21/70	1354/28/89	1276/33/104	1382/33/108	1386/35/106
P3F	126/14/47	391/24/77	1412/33/110	1373/32/94	1093/28/98	1115/30/91
VE2IM	173/10/23	774/16/70	1147/28/100	1347/32/105	1580/32/111	1438/25/96
ZD8Z	27/9/26	171/21/55	445/27/75	1041/32/88	1880/36/106	2181/34/113
VY2ZM	271/17/54	1082/23/74	1469/27/83	1083/30/90	1229/24/92	1042/26/80
KH7X	71/11/12	441/24/33	1072/34/81	680/31/82	1790/35/81	1202/35/58
CT8T	61/9/45	650/18/70	1141/26/84	1406/32/90	1236/27/99	1475/30/90

USA TOP SINGLE OPERATOR ALL BAND

Station	160	80	40	20	15	10
NT1Y	41/11/31	526/16/76	1462/31/99	635/30/100	816/28/100	610/26/87
K1DG	34/9/22	320/18/78	1137/32/93	614/30/101	933/29/94	787/29/95
K3CR	27/10/20	261/22/72	930/31/99	549/33/101	832/31/95	789/28/96
W1KM	35/12/25	617/21/77	766/28/89	650/33/89	785/25/85	596/27/90
K5ZD/1	22/8/18	288/16/69	723/30/93	747/34/109	751/29/101	622/29/95
KT1V	43/10/28	354/23/71	963/31/88	742/29/94	700/25/92	716/24/83
N2LT	20/9/16	213/18/64	819/29/92	625/32/101	937/30/97	713/26/88
K3ZO	27/8/16	259/23/82	986/34/108	493/28/88	801/28/91	568/27/88
W1WEF	26/8/17	436/17/67	672/27/96	705/34/108	624/30/97	618/29/100
W9RE	46/12/24	183/18/60	695/29/83	553/34/91	883/32/98	765/29/86

WORLD MULTI-OPERATOR SINGLE TRANSMITTER

P3A	367/17/72	937/30/99	1939/36/125	1704/37/131	1675/37/125	1701/34/120
A61AJ	193/14/59	495/30/97	2047/38/128	1607/39/138	1415/38/130	1442/36/130
EA6IB	191/13/63	623/30/101	1648/35/125	1127/37/134	1406/37/133	1553/37/128
K1KI	38/12/35	498/21/89	1412/36/120	679/39/134	963/36/134	943/34/122
RT9W	125/10/49	649/25/89	885/34/119	1214/36/133	2737/34/126	868/34/116
OM7M	102/19/77	764/31/109	1574/38/132	849/36/125	1148/38/136	689/37/130

USA MULTI-OPERATOR SINGLE TRANSMITTER

K1KI	38/12/35	498/21/89	1412/36/120	679/39/134	963/36/134	943/34/122
N3RS	30/14/28	311/26/87	1420/39/126	674/38/134	1043/35/131	605/32/120
K1IR	25/9/24	453/22/87	1141/34/117	856/38/137	1014/36/123	604/30/111
K8AZ	27/13/26	211/25/83	987/36/120	887/39/133	707/37/123	787/33/115
W1US	36/10/27	392/26/89	927/31/116	758/36/127	709/33/117	503/28/99
NØFW	18/8/17	84/18/71	454/34/111	364/35/118	519/37/126	557/32/106

WORLD MULTI-OPERATOR TWO TRANSMITTER

CT9L	261/13/59	1074/22/93	2177/35/119	2150/36/129	2822/36/126	2458/33/110
PJ2T	273/16/34	720/27/88	2928/37/123	2398/39/138	2754/35/119	2010/33/113
TS9N	519/16/65	1517/23/88	2124/31/105	1808/36/127	2070/34/117	1593/33/108
RU1A	303/20/73	1046/33/118	1723/39/138	2029/38/140	1904/39/139	1309/40/141
VE3EJ	211/13/28	729/26/90	1981/37/128	1148/37/131	1992/37/128	1396/34/117
K4JA	49/13/33	618/23/89	1607/38/134	1225/38/135	1586/37/130	1003/34/114

USA MULTI-OPERATOR TWO TRANSMITTER

K4JA	49/13/33	618/23/89	1607/38/134	1225/38/135	1586/37/130	1003/34/114
N3AD	46/11/22	391/21/81	1121/35/113	1252/39/132	1296/34/119	854/30/108
N4RV	35/10/24	257/20/79	992/33/108	742/36/124	1390/37/129	770/31/112
NØNI	33/12/22	150/25/63	922/36/122	594/37/124	1152/38/123	863/32/114
N4WW	33/12/25	203/19/79	851/29/110	615/38/125	898/36/129	932/33/116
KØTV	26/8/16	503/19/79	829/33/111	657/34/118	1031/28/115	682/24/103

WORLD MULTI-OPERATOR MULTI-TRANSMITTER

HC8N	560/23/58	1536/33/109	3325/39/132	3381/40/149	3944/39/147	3599/38/141
5U5Z	174/14/55	682/25/80	2575/34/110	4500/37/127	4687/39/134	3691/33/115
PT5A	143/16/44	324/25/83	1055/36/124	2744/39/144	3645/40/149	3196/40/144
KC1XX	198/18/57	1249/31/106	2294/39/136	2093/39/146	2176/38/139	1539/34/130
ZA1A	1265/21/81	2598/28/98	3670/35/124	2525/35/126	2418/35/124	1795/33/109
9A1A	995/17/76	1893/36/115	3129/39/138	2399/38/140	2111/36/135	1722/38/128

USA MULTI-OPERATOR MULTI-TRANSMITTER

KC1XX	198/18/57	1249/31/106	2294/39/136	2093/39/146	2176/38/139	1539/34/130
K3LR	199/18/37	673/30/103	2000/40/140	1982/40/150	1940/39/147	1422/35/130
W3LPL	183/17/42	809/27/99	1980/40/138	1774/39/144	2024/38/142	1594/34/127
K9NS	184/20/45	453/29/94	1530/37/128	1800/39/140	1995/37/139	1725/38/130
K7GM/4	34/10/23	609/23/83	1962/33/117	1566/37/134	1791/35/129	1251/32/119
K1TTT	123/15/36	740/24/9	1012/35/122	1810/38/139	1488/35/133	1207/32/120

World: 7 EA8EA (OH2MM), L21 6Y9A (WA6O), L3.5 6Y8A, Q1.8 6YØA (K2KW), A14 SO2R, A7 4U1ITU (OM3CG), A3.5 9A5Y (9A3NM), M2 CT9L.

USA: L7 W1MU, L3.5 N2TA (NP3D).

North America: All KP3Z (N5TJ), 14 ZF2AM (W5ASP), LA 8P5A (W2SC), L21 6Y9A (WA6O), L3.5 6Y8A, Q1.8 6YØA (K2KW), AA KI1G, M2 VE3EJ.

Africa: 14 D44TD (IK2NCJ), 7 EA8EA (OH2MM), 1.8 EA8EW (OH1MA), LA CT9M (KL2A), L14 9G5ZZ (DL1CW), Q21 EA8BYM, A14 EA8NQ, M2 CT9L.

Asia: All A45XR, Q14 UN7CN, AA C4M (RW3QC), A14 4L8A, A3.5 RMØA (UAØANW).

Japan: M2 JA1ZLO.

Europe: All CT8T (OH1NOA), LA CQØT (CT1ILT), L14 CU2F (SM4DHF), A14 SO2R, A7 4U1ITU (OM3CG), A3.5 9A5Y (9A3NM), M2 RU1A.

Oceania: All KH7X (KH6ND), A7 VK1AA/4.

South America: All P40E (CT1BOH), L21 CW4A (CX5AO), A28 LU4DX (LU5DX), A21 PY3CQ, M2 PJ2T.

Comments

The Multi-Two category is growing. It probably is the most fun you can have with two rigs. Check out this new category in the rules. It uses band-changes/hour instead of a time rule.

We want to thank the contest community for sending electronic logs in Cabrillo format. It takes a lot of time to create the results you see on these pages. By your sending in a Cabrillo log, many, many Contest Committee man-hours are saved, and as a very important bonus, the results are more accurate.

Please use the Cabrillo format when you submit your 2004 CQ WW log. It is required for electronic logs. All the necessary data to enter your electronic log is in the header summary. It can easily be stripped off and organized. All the contest logging programs create a Cabrillo log for you. All you have to do is submit your log file to either <ssb@cqww.com> or <cw@cqww.com> and we will take care of the rest. No matter how small your log is, please send it in, because it will help make the world database more accurate.

This year we began looking at ISP associated with packet spotting. It was surprising to find calls of silent keys, ops at a multi station, even some non-contesters who never use packet in a contest used to covertly spot a station. In the future we will be looking into this problem in more detail. You are not allowed to self-spot in the CQ WW contests.

The skill of contesters is improving with every year. The percentage of miscopied calls is declining. This is good news, and it is very encouraging to see such improvement. You can retrieve your UBN report at the <cqww.com> website.

Thanks

As you saw in the opening paragraph, this year we received a record number of logs. Thank you for taking the time to submit your log. Once we receive it, it is organized and reviewed by a dedicated group of top contesters. We would like to acknowledge their help.

Once you send your log and summary to either <ssb@cqww.com> or <cw@cqww. com>, it is processed, decoded, and massaged by Larry, N6TW. The few logs that are formatted incorrectly are handled by N5KO, JE1CKA, I2UIY, N5NJ, F6BEE, and K1AR. Dick, N6AA, makes the call database as accurate as is humanly possible. The CQ WW continues to be the state-of-the-art in score analysis. The log reviewers are K1DG, N3ED, K6NA, N6ZZ, CT1BOH, VE3EJ, N9RV, N2NC, K3WW, N5TJ, K3ZO, KR2Q, and K3LR. In addition to log checking, Phil, N6ZZ, serves as a sanity check at each stage of the creation of the master database. John, VE3EJ, helped to proofread the final results. John, N2NC, updated the all-time records.

Each year I rely on the sage advice of our special advisors: K3ZO, N2AA, N6AA, N8BJQ, W3ZZ, G3SXW, S50A, KR2Q, and N5KO. The CQ WW uses the software developed by Tree, N6TR. The DX advisors

EUROPE TOP SINGLE OPERATOR ALL BAND

Station	160	80	40	20	15	10
CT8T	61/9/45	650/18/70	1141/26/84	1406/32/90	1236/27/99	1475/30/90
OK1RF	134/10/48	723/27/89	1087/35/108	558/31/90	1009/31/102	739/33/91
TM6X	142/11/53	550/18/67	883/29/83	683/25/86	961/28/89	868/29/82
TK9A	161/5/44	757/17/69	765/19/73	1167/26/90	831/28/89	1289/30/84
YT1AD	72/6/36	539/24/69	1177/37/96	763/30/86	781/32/94	636/34/92
MW5A	60/5/40	419/17/64	1072/24/82	874/26/82	952/27/81	668/27/72
OH1F	157/7/42	363/18/65	520/29/84	964/28/92	1022/30/93	544/31/90
G3TXF	203/11/49	671/22/78	525/21/68	730/31/97	754/26/79	643/28/88
S57DX	147/7/42	704/25/79	1111/33/91	653/32/92	653/32/90	328/32/77
DJ5MW	157/7/44	607/18/73	543/26/87	527/24/89	1015/31/95	643/34/93

EUROPE MULTI-OPERATOR SINGLE TRANSMITTER

EA6IB	191/13/63	623/30/101	1648/35/125	1127/37/134	1406/37/133	1553/37/128
OM7M	102/19/77	764/31/109	1574/38/132	849/36/125	1148/38/136	689/37/130
TM2Y	264/12/61	437/26/95	1176/37/123	1175/38/131	1075/37/128	985/36/119
IR4X	117/11/64	163/26/97	1432/37/124	836/38/133	1106/39/142	1152/38/118
DJ4AX	155/15/67	900/29/102	1329/38/129	705/35/123	880/37/129	806/36/121
OK5W	104/12/64	569/29/99	1403/38/131	953/38/131	1013/38/130	754/37/117

EUROPE MULTI-OPERATOR TWO TRANSMITTER

RU1A	303/20/73	1046/33/118	1723/39/138	2029/38/140	1904/39/139	1309/40/141
9A7A	560/10/62	1363/27/98	1728/39/133	1717/37/131	1341/36/129	1686/38/126
DLØCS	263/16/69	921/30/104	1229/37/127	1285/38/125	1049/39/127	826/36/115
HG6N	519/14/64	988/26/92	1238/39/126	890/36/120	1370/36/124	1004/35/118
DJ5IW	285/10/57	983/25/92	1434/37/120	968/36/115	1045/36/123	985/38/115
OT3L	319/10/53	1066/27/94	1835/35/125	1108/33/110	1026/36/114	722/31/102

EUROPE MULTI-OPERATOR MULTI-TRANSMITTER

ZA1A	1265/21/81	2598/28/98	3670/35/124	2525/35/126	2418/35/124	1795/33/109
9A1A	995/17/76	1893/36/115	3129/39/138	2399/38/140	2111/36/135	1722/38/128
OHØZ	1127/16/69	1841/35/114	2523/39/136	3115/39/144	1936/38/135	1367/40/135
DFØHQ	719/13/69	1735/33/111	3030/39/141	2216/38/139	1841/37/140	1443/38/132
RW2F	1014/20/79	1903/33/115	2311/38/142	2239/37/134	1757/38/138	1148/38/133
GM5A	863/19/77	1488/28/100	2248/36/122	2251/37/129	1797/36/128	1196/32/115

TOP SCORES IN VERY ACTIVE ZONES

ZONE 3
N7RT 3,923,724
K7NV 1,797,873
W2VJN/7 1,682,200
K6NA 1,676,741
*N7NG 1,361,710
WA7LT.....1,308,080
*K8IA/7 1,208,765
*W6PH.....1,193,136
N7CW/6.....1,145,898
K7ZA 1,045,262
W6UM 821,340

ZONE 4
VE3AT 5,572,200
W9RE 4,949,780
K5GN 4,457,700
VE3NE.....4,422,488
W5KFT 3,189,931
VE3EY.....3,045,600
*K8CC.....3,019,803
VA3UA.....2,819,664
KØSR 2,620,431
N5BB/5 2,264,020

ZONE 5
VY2ZM.....9,763,140
VY2TT 6,843,837
NT1Y/4 6,797,675
K1DG 6,407,730
K3CR 5,999,752
*VP9I 5,854,420
W1KM 5,758,782
K5ZD/1 5,665,749
KT1V 5,616,416
N2LT 5,585,356

ZONE 14
CT8T 7,613,600
TM6X 5,295,600
*CQØT 5,174,184
MW5A 4,790,079
G3TXF.....4,502,342
DJ5MW.....4,314,708
*MU/
DL2OBF.....3,905,720
GM4YXI.....3,681,870
DL3YBM.....3,579,232
OZ1LO.....3,423,168

ZONE 15
OK1RF.....6,547,595
TK9A 5,253,822
YT1AD.....5,171,952
OH1F 4,596,123
S57DX.....4,370,912
HA8A 4,152,410
ES5TV 4,073,073
HG8R 3,621,906
ES1A 3,473,331
S53O 3,231,522

ZONE 16
RW1ZA.....3,340,653
*UA4FER.....2,487,706
*UR3HC.....2,145,027
UY5ZZ.....2,121,852
RA3TT.....1,833,120
RW3GU.....1,725,552
UA1QV.....1,631,154
RZ4FA.....1,487,628
UYØZG.....1,235,838
*UA1OMZ....1,235,224

ZONE 25
JH5FXP 4,617,976
JA1ELY.....3,042,568
JA6GCE.....2,997,134
*JH4UYB 2,606,875
JE1CKA.....2,076,360
*JI1RXQ.....1,335,152
*7M1MCT 1,287,678
JK1OPL 1,169,920
JA7IC.....1,161,043
*JF3GKE.....1,107,488

*Low Power

are CT1BOH, DL6RAI, EA3DU, F6BEE, G3SXW, RA3AUU, OK2FD, I2UIY, JE1CKA, OH2KI, OH2MM, PY5EG, S50A, UA9BA, E21EIC, VA7RR, and VE3EJ.

Congratulations to all the winners and see you in this year's contest!

73, Bob, K3EST

DX QRM

From OC-235, Blue Waters Resort on Samal Island. . . . **4D71/NØNM.** It was a happy moment to participate in the contest for the first ever time. Marginal success with low power, dipole, and dead band. . . . **4S7NI.** Tough to hold a frequency (15m) using just a low vertical, but enjoyed the contest. Nice to bag VK9CJ as my first QSO! . . . **5B4AHJ.** 5NØW is special contest station located in Czech embassy in Nigeria, Abuja. 100W, down to 15W depending on power shortage in Nigeria. . . . **5NØW**. Great fun as usual. No packet this year, which hammered our score and was a shame since we made a new QSO record for the group this year. . . . **5U5Z.** Had very fun during the contest. I chose single op 7 MHz because I wanted to test my two stacked 3-el Yagis. I managed to work nearly 600 North American stations and this is not a common everyday practice over here. Thanks to all of you guys for calling in. . . .**7S2E.** Many thanks to the Amateurs Radio Algériens, ARA, for their good will and great help, letting me operate their club station 7X2ARA in downtown Algiers City. It was big fun being the only 7X station on the band! . . . **7X2ARA.** I was using KX1, the newest Elecraft transceiver, with 4W output power. Propagation on 40m was very good, and this little rig performed beautifully. . . . **9A3RR.** I escaped into Africa just to enjoy the feeling to be chased! . . . **9G5ZZ.** Thanks to Dr. Ken, 9M2KN for help with a special callsign in West Malaysia. . . . **9M4JB.** It is first time use B4RF (contest callsign) in CQWW contest. Conditions were very good in this contest weekend. Great opening to NA. Thank you very much those who QSO with me. . . . **B4RF.** This is my first time CQWW from Taiwan. Due to heavy noise from industrial plants, it was tough for contesting. . . . **BW2/JHØKHR.** Many thanks to my old school (5B4ES) for hosting me yet again, and to 5B4XF for picking me up at 2:00 AM on Friday from the airport. Scariest moment was losing power 15 minutes before start of contest! . . . **C4W.**

Was QRV with a 25-year-old Butternut, from a friend for our new home. Hope to bring up my antennas next spring. But unbelievable what you can work with small antennas! . . . **DF1HF.** First CQWW CW contest for me! Great experience and a real great fun with N1MM logger! Enjoyed it very much and thanks to everybody who had a QSO with me. . . . **DH5HV.** The M2 idea is very good for oldies like us. . . . **DLØKF.** This was my 340th contest and the 19th CQWW DX contest with my best result. . . . **DL3KWR.** Concentrate only on the Top band. Worked the first time with a helium balloon, but only 10 hours. Performance was great and had 2-3 S-units more. 165 ft. high triple leg for 160m was a big antenna! . . . **DL7CX.** Conditions on 10m very nice at the right time for the CQWW. I had a lot of fun. My first time in the CQWW. My thanks to the U.S. fellows for points in my little pile-up. . . . **DL7NS.** DP1POL is located at Neumayer Station, a German polar research base in Antarctica. The contest was held on the same weekend that our supply vessel, the German icebreaker "Polarstern," arrived at the station, so everyone was extremely busy unloading the ship, and there was only very limited time for operating the radio. This contest entry was probably my last one signing DP1POL, as I will return to Germany in February 2004 after 14 months of working as a radio operator in Antarctica. . . . **DP1POL.** Who says CW is dying! . . . **EI7JK.** Thanks for nice contest! . . . **ES1TM.** Only a parttime effort. Nice to have 10m open! This is the first time I have entered this contest. Many thanks to all. . . . **G3GLL.**

CQWW CW is the best CW contest by far. More DXpeditions, more great operators, more super-stations, and much more to work! CQWW CW did its usual magic with the sunspots too! . . . **G3TXF.** Everybody said I must be mad to do 80m QRP! I could see their point, but I was astounded by what I could work with just 5 watts (homebrew). . . . **G4EDG.** At last! A contest where everything worked (most of the time)! Murphy must have been on vacation. . . . **G6PZ.** Highlight: ZD8Z calling me close to the end! Lowlight: Falling asleep with my finger on the F1 key; also getting up at 0500 Monday to fly to SM5 for work! Great fun. . . . **GU4YOX.** I slept both nights for a couple (well, okay, four or five!) hours, resulting in missing the greyline on 160m both days! Conditions were okay, but 10m was far better on Saturday with a weak aurora affecting Sunday. N1MM software rocks! . . . **GWØGEI.** With the small, rather inefficient mobile antennas I used, I should be ranked among QRP participants. Pity there is no "small antenna" sub-category. . . . **HA5X.** I had a lot of fun and was very happy to overcome world record. Thanks to all who called me! And also thanks to Mauro, IN3QBR, for the power generator. . . . **IH9P.** After more than 15 years in CQWW CW contest we have finally broken the 10M points barrier. Propagation over our best expectations. . . . **IR4X.** Operated from rental shack Akagi in Gunma prefecture owned by JE1IKA. The shack is located on a mountain and I really enjoyed a very good opening toward NA and EU from there. . . . **JA1BPA.** Thanks to the calm geomagnetic conditions, the entire contest was enjoyable, although the propagation of higher bands was much weaker than last year. I appreciate the operators who dealt with my weak signal and listened to the repetition of my very long callsign presumably coming just above or even under the noise. . . . **JJ1BDX/3.**

First contest with new call. Antenna quirky but conditions were good. Holiday season kept me away more than I could have been. . . . **KH6OO.** First CQWW CW single op all band in 20 years for a new Oceania record! Aloha. . . . **KH7X (KH6ND op).** Another fun contest from NP4Z's QTH, although it didn't begin that way as no commercial power the first 13 hours. Ran 100W on a generator. Congrats to Jose on a fantastic QSO total. . . . **KP3Z.** Very happy for having Bruce, KD6WW, sharing a contest with me from home. We enter in "have fun category" and we had it indeed. Thanks to LW8EXF for her support. . . . **LU7DW.** Great contest. Me and my father made our best score. I think we will be first in the Multi-Single category (300W!). . . . **LZ1ABC.** Thanks to VE1ZZ for having good ears. . . . **MØAJT.** Wow! Conditions on the low bands were really great. I managed to work several new countries on Top band. Computer problems as usual didn't help, but a cool contest. I will be entering next year. . . . **M5FUN.** My first CQWW entry and a major effort for a 77 year old. Many thanks for assistance from many stations. . . . **MMØWPM.** Guernsey is much too beautiful to go there only for contesting. Therefore I am glad that I had one and a half days this time to explore a bit of the island. Thanks to the Gars and especially to Phil Cooper, GUØSUP! You have once again been great hosts! . . . **MU/DL2OBF.** I was surprised by the long path openings and the fact that I had no direct opening to VK's and ZL's. However, I was able to work a few ZL's by long path. . . .**OA4SS.** Estimated that running barefoot I could make around 600 QSOs single band 80m. So I thought I'd give it a try. Ended up with almost twice that QSO number. Astonished to see what is possible running only 100 watts into a simple coil-loaded dipole. TNX to everybody who called me. . . . **OE5CWL.**

Turning the superb OHØZ SOAB station into a full-scale Multi-Multi in a few days was a challenge but an exciting one. Ultimately the biggest surprise was the propagation, as we did not expect to get this close to our OH2U European Multi-Multi record this year any more. If there is one contest we'll enter every year it sure is CQWW CW. Thank you all! . . . **OHØZ.** Conditions were nice, better than 2001 or 2002! My best SOAB score ever! . . . **OH1F.** It was great fun! . . . **OH2BJ.** My age 69, my contest number 800. . . . **OK2ABU.** It is really very good contest, like Olympic Games. . . . **OL4W.** Overall conditions not too good, but first time 20 zones, great! And managed to get to #200 on Top band, wow! . .

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Wolff, DJ5JH, using the special call J43J, operated from the Peloponnese peninsula in southwestern Greece, Single Op, 14 MHz, Low Power.

. **ON4WW.** Always a lot of fun. . . . **ON6LO.** Great fun with these excellent conditions! A lot of operating hours for the only five full-time operators. No good strategy yet for Multi-2 so we missed too many mults on 10/15/20. . . . **OT3L.** My first trip back to Aruba in 2-1/2 years. Great to see old friends again and lots of fun in contest. Unfortunately I slept too much (again!) and lost power for 3 hours—excuses, excuses! . . . **P40R.** Entered the contest with a new call, PA1V (ex-PA3ELD). It did a great job during the pileups in the contest. . . . **PA1V.** Just some words: fun, fun fun fun! . . . **PA3BFH.** Thanks to Waldir, PY2WC, for chance to use his good station. Next time we need improve the 10 meter antennas and 80 meters. . . . **PQ2Q.** This is our first activation in CQWW CW contest in Multi-2 category! It is very interesting! . . . **RN9WWW.** Superb conditions on 80m. Managed to work really cool DX such as HC8, JT, 5U, 6Y, etc., with only 100W. . . . **S58J.** Surprising good conditions. 10m open both days to west and south. 20 workable til end of contest, though aurora made signals flutter. Beat my last year's record by almost 100 QSOs with less active hours. This contest is real fun. . . . **SM7BJW.**

My great pleasure to Sergey (TA2ZF, MØSDX, UT5UDX) and his wife Lyuda for warm hospitality! . . . **TA2ZF.** After 15 years abroad, last call OD/F5SQM (my wife's call), I'm back from France. I missed you, CQWW CW contest! . . . **TM4Q.** First major contest from new retirement QTH after many years as G3MXJ. . . . **TM6X.** What great contest! What fun! Average skill of ops is getting better each year! Did I hear someone say CW is fading away? . . . **UA9AYA.** DXCC program on 80m for two days. It was beautiful! . . . **UW5U.** Murphy must have been on vacation; everything actually worked! . . . **VE3BW.** So this is low sunspots, is it? . . . **VE3PN.** Good conditions! What planet is this? . . . **VE6EPK.** You know it's time for a break when the voices in your head have loud arguments. . . . **VO1AU.** I have a good start on my "Worked All ZO's Award," having worked K6, K9, N2, W5, and my college buddy K3ZO in the contest. . . . **VP9/K9CC.** Thanks to Jeff, K1ZM, for the chance to operate from VY2. Fabulous station and conditions made for a fun weekend. . . . **VY2ZM.** My thanks to Ramon, XE1KK, for opening his home and station to me on such short notice. Mil gracias, amigo! . . . **XE1NTT.** My first CQWW DX contest. Amazing fun! . . . **ZS1AN.** My first try at the CQWW CW contest! . . . **ZS4JAN.** Great fun working stateside 10m in good form . . . . **ZS5RON.**

USA QRM

This was supposed to be a bad sunspot year? . . . **AA1K/3.** Wow! What an amazing contest. It just doesn't get any better than this. . . . **AK5X.** Fantastic ops, great competition, outstanding conditions, and a much improved station all combined for a tremendous contest. After chasing a persistent line-noise problem with the power company for months, the noise disappeared just 24 hours after the end of the contest! . . . **K1IR.** My first ever CQ contest. Sixty countries with two simple wire antennas. I'll be back next year! . . . **K1KAV.** There are no meters like 10 meters (when it is open). Tiny hobby-shop brass-tubing vertical on a tiny lot with 25 tiny radials equated to a lot of calls but also a lot of fun running low power. Long live CW, the great equalizer (?). Well, kinda. Thanks for another great contest. . . . **K2RR/4.** This year I decided to not call CQ at all, just hunt and peck! Still made DXCC! . . . **K3ZX.** As usual a wonderful contest thanks to CQ! Conditions were down this year, especially on the low bands. . . . **K4XG.** Looks like my last DX contest from this part of the country. It's been fun, but now it's time to go home! Texas here I come! . . . **K5IID/8.** Was just going to play around, but conditions were so good that I couldn't stop! . . . **K5ZD/1.** Nice to see the JA's back in force, resulting in some nice runs. . . . **K7OX.** Conditions here in the northern latitudes were fantastic, the best in many months. Had a ball. . . . **K7RE/Ø.** My first "The Contest" in the U.S. Truly enjoyed working the contest at Dave's (K8CC) fantastic station. . . . **K8CC (KK8I op.).** It was nice to look at the propagation report and see the K-index at 1 during a contest! Probably the best conditions for a contest weekend this fall. . . . **K8IR.** CQWW CW is the king of all DX contests, by far! Need more zone 12 activity on CW. . . . **KC1XX.** Fired up 34-year-old Heathkit HW-100 after 8 years in storage. Used CQWW DX to check her out and get fist back in shape. Tough to compete with contest keyers with my 7 wpm, but still lots of fun. . . . **KD4RM.** Highlights were 9M4JB calling me; working JA2YBK on 40m; S9SS, HS1OVH, and VK2KM calling me while running on 20m on Sunday afternoon. Lowlights were my antenna mast rotating and damaging the rotor control cable. Had antenna pointed northeast for about 6 hours; managed to turn it north for the last couple of hours! . . . **KE1FO.** Was really surprised to have great condx without a solar flare! Wish now I had fixed the 80 meter antenna. My sig so weak that many ops came back to K1GC. That's me! . . . **KJ9C.** This is "The Contest." How could I have missed it last year? Never again! . . . **KT1V.** Our amp-to-Q rate was terrible as we blew four amplifiers within the first two hours of the contest. Fortunately this was enough time for Roto-Rooter to pump out the septic system and we could all finally go to the bathroom! . . . **NØFW/8.** My best CW performance ever in the CQWW, at age 76 after several decades of contesting! . . . **N1AU.** Antenna falling down after the first night. I had to climb up there 16 times. The wind was terrible. The weather was horrible. The tower was 45 feet high. I got sick and had lots of fun. . . . **N2TA.** First time in a M/S with only three ops. Had a ball and got plenty of rest as well. Thanks to Alan and John for a super effort. I hope next year we will go for M/2 again, perhaps with a full team. Thanks also to all the FB ops who worked us. . . . **N3RS.** Had fun on 80m single band but missed some juicy stuff—9M8, 9V1, TO4WW—ugh. . . . **N4CC.** With the two big-time contest stations on opposite sides of me (W9RE and N9RV) both suffering hardware hexes, it stands to reason that some would rub off on the low-profile guy in the middle. Although things didn't go according to pre-contest plans, I think the results exceeded my expectations. A special tip of the hat to Mike, W9RE, for overcoming his problems to post his fine score, and kudos to my hero, Mel, KJ9C, who ran up 1.6 meg while having fun with his truly

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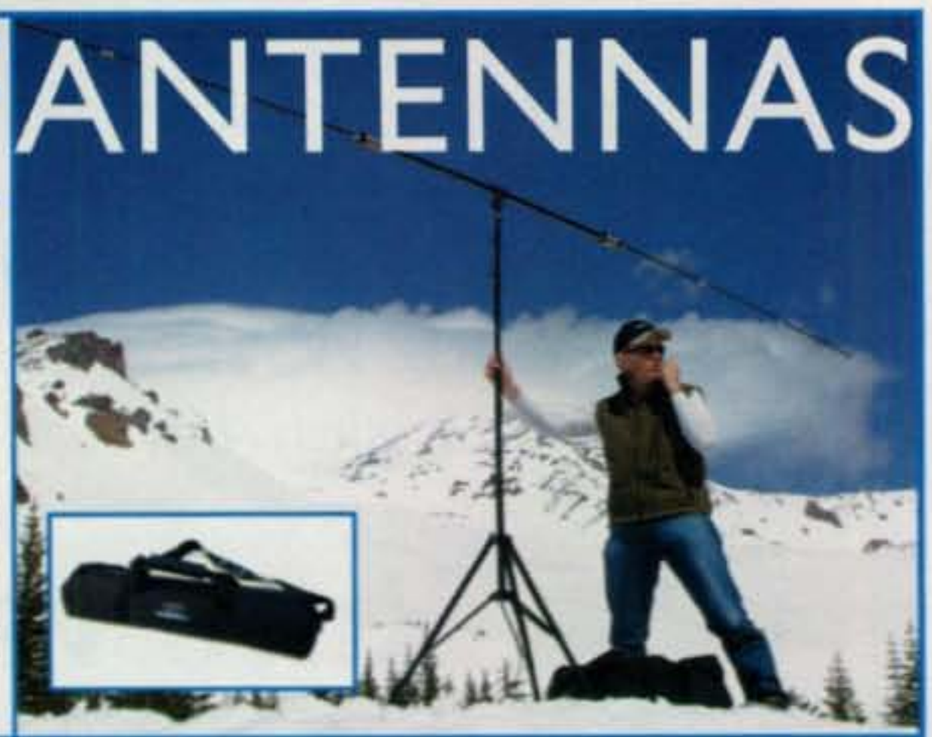
Soyhan, TA2IJ, Single Op, 7 MHz, High Power from Asiatic Turkey.

DK3YD, the op at club station DKØMN, Single Op, All Band, High Power.

low-profile low-power black-hole station. . . . **N4TZ/9.** Happiness is working XQ and 9J on 10 meters before the packet pile arrives. . . . **N5RG.** This was a parttime effort at the K4VX super-station. Thanks to Lew and Terry for the hospitality and for letting me play with the big stuff! . . . **N9JF/Ø.** Interesting auroral on high bands and 40m long path condx for contest. Thanks to home ops and expeditions who provided rare mults to the multitude. . . . **WØETT.** Amazing what one can do with 100 watts and a vertical antenna on 10 meters when the band is open. By far my favorite when it's up. Glad I worked the "rare" ones on Saturday before the DX chasers made pile-ups on Sunday. Thanks for all the Q's. . . . **W1END.** The highlights were many, but the best had to be late Sunday afternoon when I was looking for a spot to call CQ. Tuning down from 7.050 I found an open spot at 7.042. The contest was in its final hours and the only thing I was really disappointed about was that I had not worked TO4WW with my 100W. So just as I find an open spot at 7.042, and as I am about to hit the CQ function key, TO4WW calls CQ right there. How 'bout that?! . . . **W1MU.** Next year I will make to send everyone at home (including my dog) to a CQWW weekend—Disney perhaps. . . . **W2/KP3T.** First time to break a million in CW test! 100% S&P with Writelog. Writelog rocks! . . . **W3CF.** First CW contest in 40 years. Had a ball. It is 24 hours after the contest and I am still hearing CW in my head. . . . **W3PT.** Pretty decent conditions, so what's my excuse for the poor showing? Best I can come up with is that two weeks ago while in the process of lengthening my 80m dipole for the contest I fell off my roof and suffered a compression fracture of L1. Not recommended training for CQWW. I'll try to think up a better excuse for next year. . . . **W5ZL.** TU operators of the Europa DXpedition! . . . **W8PT/3.** Great participation as always; the king of contests! . . . **W9RE.** Thanks to/for: best DX ZL6QH, 8200 miles (1640 miles/watt); Japan, JA5BJC and JH4UYB (for being my only Asiatic Q's); new/infrequently heard DX (for me), 5U5Z, GZ7V, MW5A, T32WW; K/W stn ops who answered my calls for country/zone multipliers; KH7X (*mahalo* for connecting me back to my home state); letting me have "virtual visits" with 64 other countries. . . . **WB6BWZ/4.** WW = Wild Weekend! . . . **WO4O.** What happened to the big flare they forecasted? I had made plans to skip the contest but returned early from Lake Tahoe when I heard the bands were open! Some contest is better than no contest! . . . **WT6G.**

(Continued on page 104)

W3FF ANTENNAS



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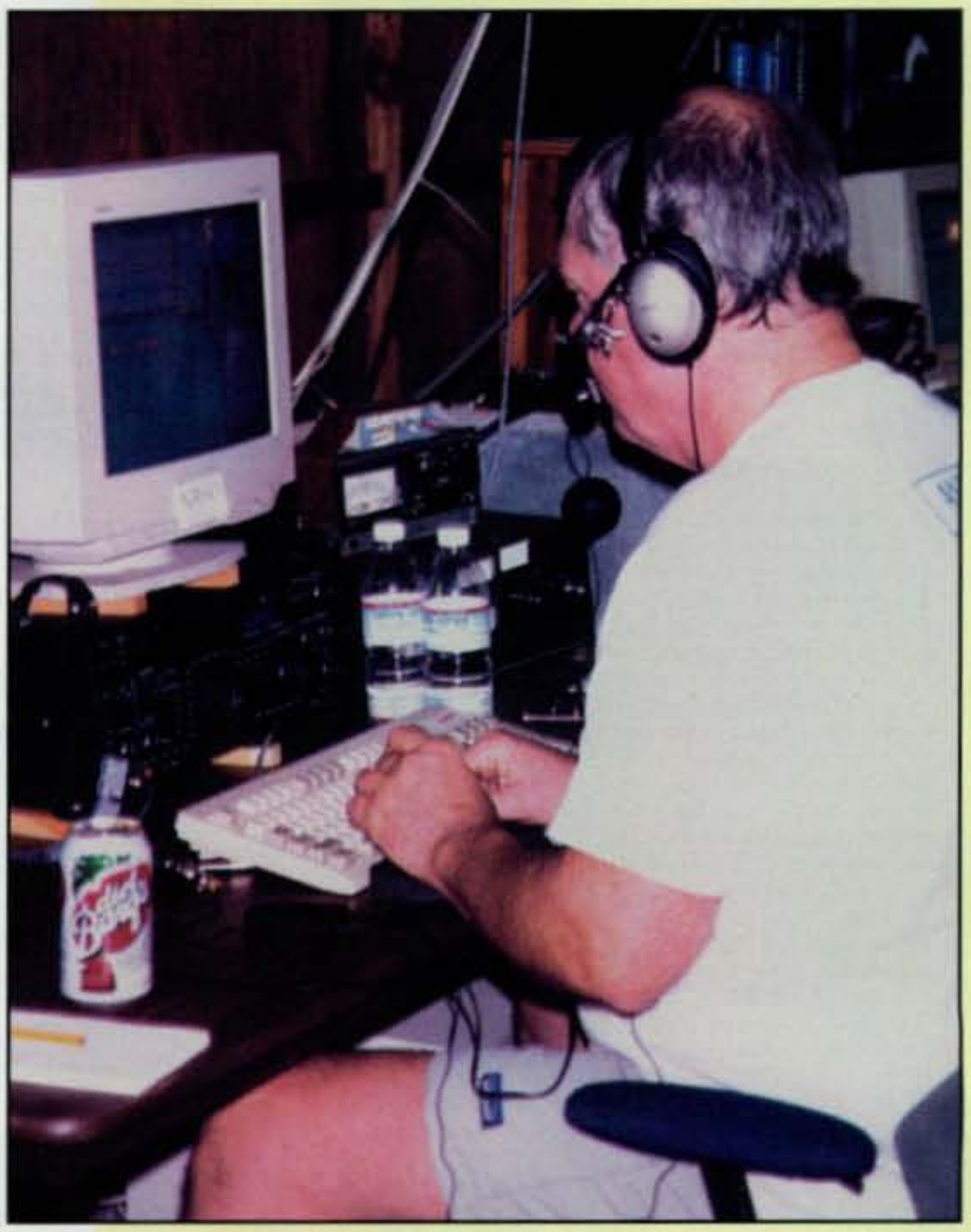
Contest operators try to maximize their scores by finding the best balance between their overall number of contacts per hour (rate) and the number of multipliers, or different places (varies by contest) they contact. WA7LT (formerly W9LT) offers some tips for the contester who's no longer a "little pistol" but not yet a "big gun."

Rate vs. Multipliers

A Contester's Strategy Guide

BY C. LAMAR RAY,* WA7LT

In virtually all contests, the final score is some product of QSOs (points) times multipliers, which, depending on the individual contest, may be countries, counties, zones, grid locators, etc. Therefore, maximizing your rate—i.e., the number of QSOs—is meaningless unless the number of multipliers is also optimized. In each of the major DX contests, with the possible exceptions of ARRL Sweepstakes and CQ WPX, time must be taken away from running stations to search for multipliers. (Even with Sweepstakes and WPX, less than optimum directions and bands must be used while hoping for multipliers to call.) Then there is the really big trade-off between more QSOs on the hot bands and getting a few more multipliers on the slower bands of 160, 80, and 40 phone (also 10 meters during the sunspot minimum).



Maximizing the number of multipliers in a contest is an important factor contributing to a good score. Steve, K6AW, is shown here on 10 meters as part of the NR6O multi-operator, multi-transmitter team in the CQ WW WPX SSB Contest. (Photo by K2RED)

Background

No information on contesting is useful unless you understand the perspective from which the overview is gathered. In my case, I have had the pleasure of 50-plus years of HF contest activity, having earned my first SS CW section award in 1948 and my first CQ WW DX CW single-band call-area award in 1950 (both due to virtually no competition). Contesting has been my big passion ever since. Life was really simple until I got a taste of multi-operating with K1NBN back in 1963, quickly followed by some really big experiences in 1964 and 1965 with the super gang at super station K2GL (later signing N2AA).

Since those life-changing events, I have had the pleasure of gaining knowledge and experience with several contesting clubs and other multi-operations such as W9ZRX (signing N9MM), NK7U, and my own W9LT. There have been many Field Days and single operations at a few big stations, too. I've operated from the East Coast, West Coast, "black hole" central U. S., and even two years from southern Europe. All of these operations have allowed me to get a fairly good feel for just what is needed to get a good score, even though my personal operations have not been at the very top of the heap.

In this article my comments are limited to what many statesiders consider to be the major contesting events: CQ World-Wide DX, ARRL DX, CQ WW WPX, ARRL Sweepstakes, and both the CQ and ARRL 160 Meter contests. These are also the contests in which I have the greatest first-hand experience.

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e-mail: <wa7lt@arrl.net>

Bell-Shaped Gaussian Curve

If you take a look at the year-after-year band breakdown of QSOs by the larger stations with well-rounded antenna farms, it will not be long before you observe that the number

of QSOs per band pretty much forms the well-known bell-shaped curve—i.e., Gaussian distribution. Depending on the year, the bands with the highest number of QSOs will interchange; during sunspot maximums it will almost certainly be 10 or 15 meters, while during minimums 20 is almost certain to be best. There really are only two problems with striving for the bell curves: 40-meter phone puts an almost insurmountable burden on most of us (especially those with modest antennas), and on the West Coast 75-meter phone is a big problem due to restricted band privileges in Asia. You should look at your QSO total curve shape as you enter the last half of a contest and decide just which bands to emphasize. After the contest you can use this same process to help decide which antennas need redesigning for the next season—ugh.

This band-by-band smooth curve suggestion is valid even for Sweepstakes (primarily a domestic contest), except that it could be inverted. From the East Coast, 80/75 and 40 meters are best for QSO totals, 10 and 15 are required for lots of multipliers, and 20 is a battleground. From the West Coast, 10 and 15 (and maybe 20 during sunspot lows) are best, but 80 and 40 are needed for those rare western multipliers. From the "black hole" in the Midwest, 80/75 and 40 are the big producers, since you can hit both coasts and most multipliers. In any event, look at the shape of the curve for QSO totals both during and after the contest to see if you are well balanced.

Operating the Bands

When you are on the East Coast in a DX contest, you get the opening shot at everything. When you are out west, you get the last shot. Take maximum advantage of those situations. From the east, keep working stations to the east of you until the small stations to your west start taking over. In the west you have the early advantage into Asia, and then as the band closes you have a three more hours when you dominate Asia. As to the "black hole," that is how it got its name; it is good throughout every opening, but seldom is dominant for long.

In order to get the greatest number of QSOs in the log, try to stay with the highest frequency band that is really open, the band that can produce the most QSOs per hour at that time. Sunrise and sunset are the extremely critical periods on 10, 15, and 20 meters. From the east that will nearly always be when that band first opens to Europe in the morning, and later to Asia, around your local sunset.

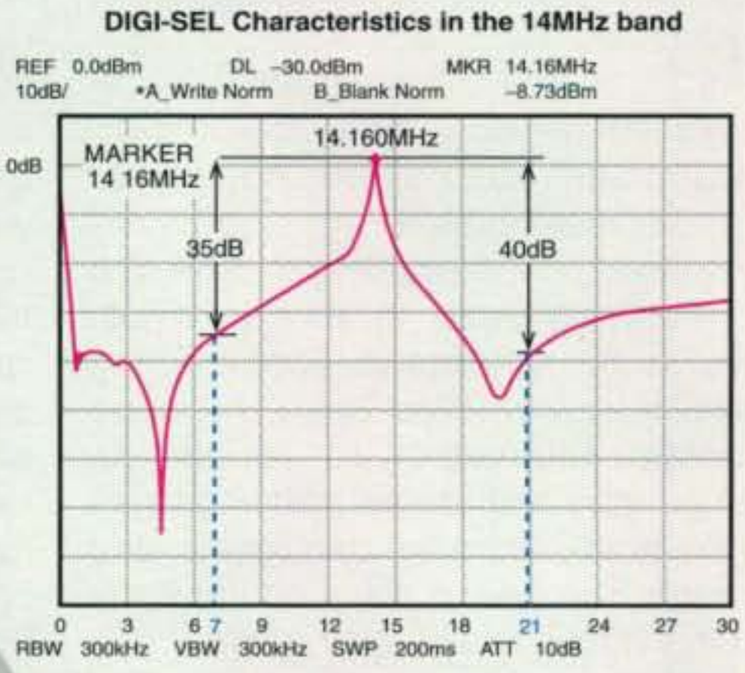
TECH TALK

IC-7800 Digi-Sel: State-of-the-art preselector

Top-band enthusiasts and multi-multi contest station operators place incredible demands on their receivers. On 160 meters, amateurs who live in urban areas often have one or more local 50-kilowatt AM broadcast transmitters operating just below 1.8MHz. On any band, multi-multi contest stations may have as many as six full-legal-limit transmitters operating simultaneously, with antennas located very close to each other. If undesired out-of-band signals saturate the first mixer stage, the receiver will be useless for weak-signal DXing or contesting. Even a receiver with a +40dBm Third Order Intercept (TOI) can be overloaded under these extreme conditions!

External bandpass and band-reject filters are one way to battle strong out-of-band signals. Another device that's very useful for out-of-band signal rejection is a receiver preselector. Several popular radios of the 1970s had receiver preselectors that worked very well, but required manual adjustment whenever you changed frequency by more than a few dozen kHz. Although they improved receiver performance when adjusted correctly, they could seriously degrade receiver performance if you changed frequency and forgot to "tweak" the preselector control.

The ideal preselector adds selectivity to the receiver front end while automatically tracking the tuning control. Enter the IC-7800 Digi-Sel tracking preselector! The IC-7800's microcontroller tunes the Digi-Sel preselector automatically so that its response peak is always centered on your operating frequency. The following diagram shows the actual measured response of the Digi-Sel tracking preselector when the IC-7800 is receiving in the 20 meter SSB band (14.160MHz). Notice that the preselector suppresses signals on 40 meters (7MHz) by 35dB and signals on 15 meters (21MHz) by 40dB!



The IC-7800 tunes the Digi-Sel preselector by adding and subtracting inductance and capacitance from a tuned circuit. Icom's engineers designed the preselector for absolute maximum immunity from strong-signal overload and for absolute minimum distortion by using state-of-the-art ultra-miniature relays instead of switching diodes. A preselector that uses switching diodes can introduce in-band spurious signals in the presence of very strong out-of-band signals — a preselector that uses relays and passive components (inductors and capacitors) cannot.

How could we make Digi-Sel even more useful? By including one in each of the front ends of both receivers in the IC-7800! Imagine using dual-watch on the same or different bands with two identical, independent receivers, both of which have a tracking preselector in the front end!

Better yet, don't imagine it — try it for yourself! Test-drive the new IC-7800 at your favorite authorized ICOM dealer.

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Your QSO count in a contest depends on a number of factors, including knowing when the bands are open to a particular area of the world, depending on where you are located. As an example, on the East Coast of the U.S., the band first opens to Europe in the morning, and contacts with stations such as OZ7SKV (op OZ3MC shown here) in the CQ WW DX SSB Contest are possible. (Photo courtesy of OZ1KC)

(The Asia situation will represent a shorter opening with much more competition, but you need those QSOs.)

From the west the situation is reversed. There you get the dawn opening to the east, but it is three hours after the East Coast gets it; the signals will be weaker and the opening shorter, but you must squeeze in those QSOs. Then, in the afternoon and evening (morning in Asia) you have the huge advantage into Asia on 10, 15, and 20. You can stay with these openings well into the night, since fighting for 40- and 80-meter European QSOs on the early opening will be really slow going.

It is always a balancing act:

• At dawn, 40 and 80 are open to Asia, and from the west you should have an excellent 40-meter long-path opening into Europe.

• At dawn, 20 is wide open to either Europe or Asia, depending on the point in the sunspot cycle.

• Just a few minutes or perhaps an hour after dawn, 15 is wide open to the east.

• An hour or two later, 10 is open to the east, with distance and duration of the opening again being functions of the sunspot cycle.

Make those band changes quickly, going up in frequency as necessary to keep the QSO rate highest. Remember, the higher the frequency band the shorter the opening will be in a given direction—you cannot get those QSOs back later.

You should reach your peak rate (QSOs per hour) during either the evening or morning opening. Carefully watch the short-term rate meter on your computer's contest logging program; even a small station should be able to see it hit 80 to 100 on peaks, and for large stations 150 to 250. When it starts to drop below two thirds of the top, you sense things on that band are slowing down. When the long-term meter gets to about two thirds of the maximum it has read, it signals you to look for multipliers or a better opening on another band, if that is possible.

Real Situation

The real situation is never an ideal one, and so it is with a contest QSO rate. There are freak openings that can yield many special multipliers. Then almost every station has at least one band on which the owner perceives the antennas as "really working," and at least one they perceive as not really that competitive. There is even the situation where a local broadcast station, another local amateur, or some other noise source causes receive problems.

Remember, you may be able to work stations at a high QSO rate, but you also must maximize your multipliers. I suggest that when you start on a new band, you begin at the low end and proceed up. You may be able to work stations this way at about half of your good run rate, and at the same time find many of those needed multipliers using search-and-pounce. Then, as you find a moderately clear frequency, try calling CQ four or five times. If it does not work, continue up the band periodically doing the same thing. If conditions are not in your favor and calling CQ does not work, a full band pass should not take more than about a half-hour and then you can try another band. If calling CQ was successful and you hold a frequency with a good rate for an hour or so, make a fast pass across the entire band looking for multipliers before changing to another band. Do not make the mistake of staying in a huge pile-up for too long, as depending on the contest, a multiplier will be worth only three to ten QSOs. Note that the rate window of the CT logging program always lets you know how many QSOs equate to a multiplier. (Late in the contest that needed multiplier may even be just begging for QSOs.) Always remember you are not simply DXing, but trying to maximize your contest score.

If you have a band you consider less competitive due to a modest antenna, it is frequently best to concentrate on the other bands and save that one until later in the contest. By that time most of the really big guns will be out of the way, and you can catch up in a relatively short time. (For example, a triband beam on 20 meters will not keep up with the big guns; you must sandbag there until late in the contest. Also, you will not want to open the contest on 75 meters with a 70-foot high dipole even if you are on the East Coast.) The same applies if you have a unique receiving problem due to fluorescent lights, interference from a broadcast station, etc. If you have one particular band with a really big antenna, stay with that advantage for as long as it is productive.

The Operator

I think of a band under good conditions as being made up of three layers. The top layer usually consists of those stations with high power, or those with modest power and a good antenna (beam, low-band vertical, etc.). The middle layer usually has those with modest power and a low outdoor wire, or those who are QRP with a good antenna. Then there is that bottom layer of those running very low power with extremely compromised antennas (indoor, balcony, etc.) or modest mobile setups. If you are to get your rate going throughout the contest, you must be able to run that third layer.

If you have a big enough signal to run stations, the techniques of the operator will really control the situation. Whether on phone or CW, when many stations are calling, you must always try to come back to a full call. Try never to wait until everyone calling stands by and then pick the first or second one who calls a second time. (Next time everyone will just call longer.) If you must come back to a partial call, try to make it the first station to start in the pile-up and not the last to sign—i.e., come back to "DJ7?" and not "?LBC." The net result will be to speed things up the next time you stand by.

When running stations, you, the operator, must convey the need for urgency through your operating practice. If too many stations are calling, really speed things up. On CW this may mean going to about 35 to 38 wpm; on phone speak as rapidly as possible, since your target will be about four full QSOs per minute. (On phone always try to break abruptly after each letter, leaving a very small space between, just as on CW; it takes practice. Carefully select phonetics that are sharp, crisp, and fast to say, such as "fox" instead of "fox-trot," or "sugar" instead of "Santiago," or "whiskey" instead of "Washington.") You will find

the sharper fast-paced operators tend to stay lower in the band, especially for the first day. If you need more control of the calling stations, high in the band may be better for you, but you will probably sacrifice rate. As you begin to run out of calling stations while low in the band, you may want to move up in frequency and slightly slow the operating pace to snag that third layer of weak stations.

Sorting the Stations

As strange as it may seem, many super operators tend to perform the receiver selectivity function in their heads instead of within the receiver itself. In other words, they seldom choose to run a receiver band-pass of 250 Hz on CW or 1.8 kHz on SSB. Instead, they feel they can have a better chance of selecting a station (or perhaps two or even three at a time) out of the pile-up using their mental processor and the receiver pass-bands of 500 Hz (or even 1000 Hz) and 2.5 kHz for CW and SSB, respectively.

With the wider bandwidth, more stations will be heard, both wanted and unwanted. Now here is where the real distinction between a good operator and a casual one comes into play. The casual operator will leave the RF gain fairly wide open; when he hears his first station start, it usually gets trounced when either QRM with QSB or a slightly stronger station captures the AGC. The net result is that the mind finds it almost impossible to continue to copy the weaker first station. On the other hand, the super operator will turn the receiver AGC way down to the point where only the strongest stations barely wiggle the S-meter—i.e., just capture the AGC. (They will even include additional receiver attenuation on the low bands, and maybe even up through 10 meters.) Thus, the desired weak signals are at a constant audio level controlled only by the audio gain control, and yet loud deafening signals rise just enough above the AGC threshold to prevent hurting their ears. Try it; you might like it.

Conclusions

Good operators are just plain good! However, they do have an excellent working knowledge of propagation from their area, they really know how their antenna systems get out band by band, they really know how to use their receivers, and they have years of practice. By learning from them, and from your own experience, you, too, can become one of those good operators. ■

TECH TALK

IC-746PRO - How to tweak your DSP

Ready for new radio thrills and excitement? Gear up with Icom's new IC-746PRO and experience a totally new dimension in amateur radio enjoyment!

This new generation transceiver delivers unsurpassed DSP performance on all bands and modes, it is affordably priced, and it can also be tweaked to fit your particular operating needs or band conditions at the time. This Tech Talk overviews that concept.

Receive DSP Tweaks. First, you can select a built-in filter bandwidth that is fully adjustable from 3.0kHz to 50Hz for superb sounding SSB audio, copying weaker stations and dodging QRM or working CW in high style, as desired. Second, you can use the Twin PassBand Tuning controls to further tweak a selected filter's center frequency and width. By adjusting the concentric controls together, a received station's bass, mid range or treble tones can be emphasized. By adjusting them separately (one up, one down), a chosen filter's bandwidth can be sharpened to eliminate "side QRM" lower and/or higher in frequency. You can also menu-adjust the upper edges or shoulders of a filter's response curve and tweak the receiver's bass/treble equalization to mate with your hearing preference. Add in multiple AGC loops which, combined with the IC-746PRO's excellent DSP system, prevent strong adjacent frequency interference from reducing receiver sensitivity or causing "pumping" of receive audio, and you have new millennium performance supreme!

IC-746PRO

Supercharged Performance!

As Ray Novak, Icom's National Amateur Sales Manager, discovered during DXpedition operations from A52RN/Bhutan, copying a weak (S3) signal only 200Hz from a strong (S9+) signal is a cinch with the IC-756PROII... which uses the same DSP engine as the IC-746PRO. Now that is impressive!

SSB Transmit Tweaks. Three choices of transmit filter bandwidths, 2.8, 2.4 and 2.2 kHz plus adjustable microphone equalization let you custom-tailor the IC-746PRO's transmit audio to match your particular voice characteristics. By selecting a wide filter and boosting bass, mid range and/or high tones in that chosen bandwidth, your voice can sound extra-rich and full-bodied – even better on the air than "in person." By selecting a narrow filter and emphasizing upper range/treble tones, you can produce a remarkably strong signal with maximum "talk power" for DXing or communicating under adverse band conditions. Additionally, all filter and equalizer settings are easily changed so the IC-746PRO "has a different face to fit every need."

The Digital Difference. Some amateurs may understandably question how the IC-746PRO's performance is superior to other transceivers of similar power and bandwidth. The answer is using IF level DSP plus ultra-steep skirted filters. Combined, they ensure you hear good and sound great yet stop interference and "splatter" like a brick wall. That is the PRO's advantage and it is terrific! Test-tune an IC-746PRO at your favorite dealer and see for yourself!

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math's notes

BY IRWIN MATH,* WA2NDM

Logic Circuits without ICs

Many of us are familiar with the use of ICs to generate various logic functions in circuit designs, but what does one do when only one gate or function is needed? It seems a shame to employ a hex inverter (for example) when only one inverter is required. Companies such as Texas Instruments have one possible solution, which in the case of TI, is its "tiny logic" series. These still consist of ICs (and very tiny ones at that), but with only one or two gates per package. If we go back in time to the way that the very first resistor-transistor logic (RTL) and diode-transistor logic (DTL) circuits operated, however, and use those concepts as well as some basic circuit principles, we come up with an approach that does not require ICs at all. As you soon will see, only transistors,

*c/o CQ magazine

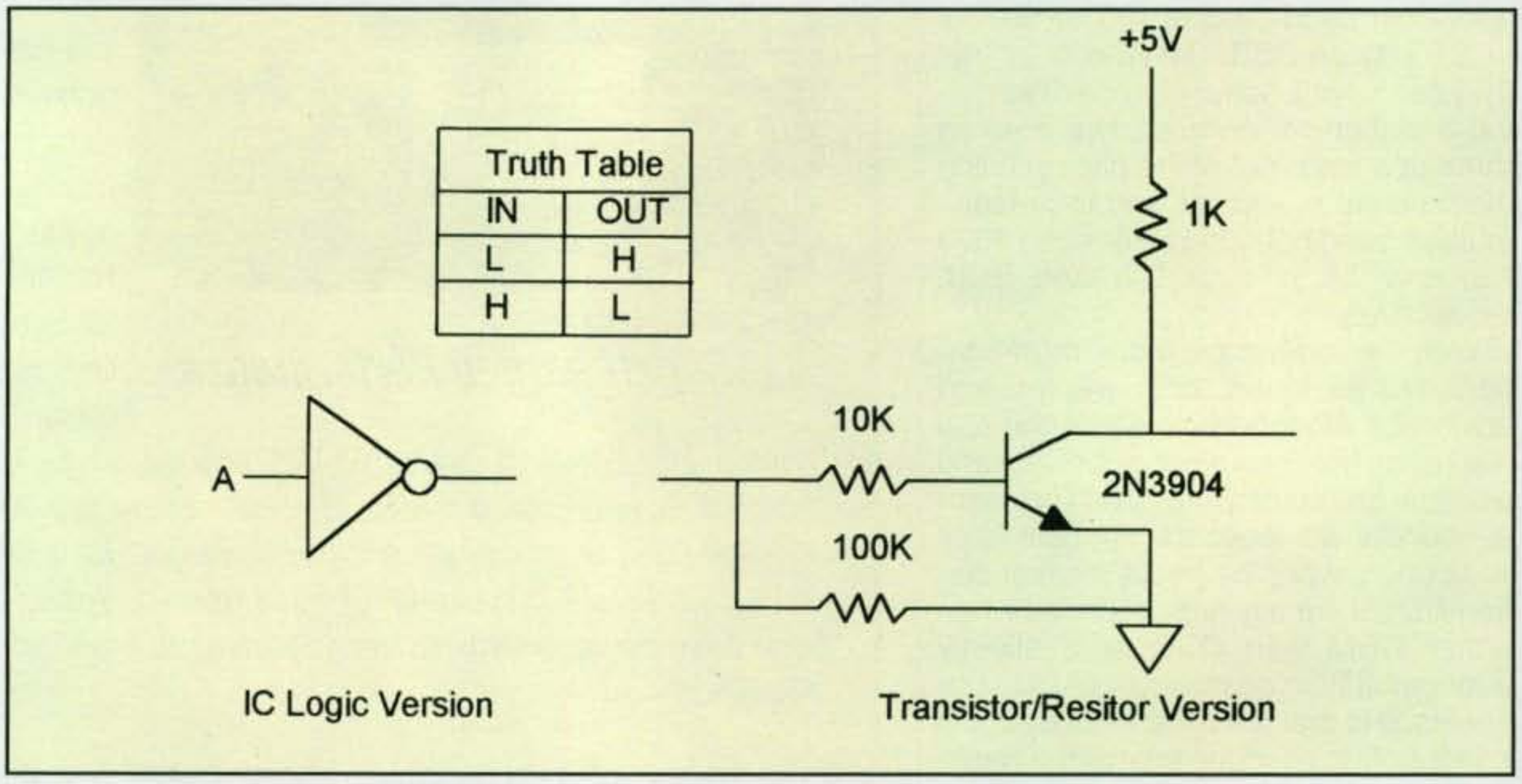

Fig. 1– The inverter, or NOT, function.

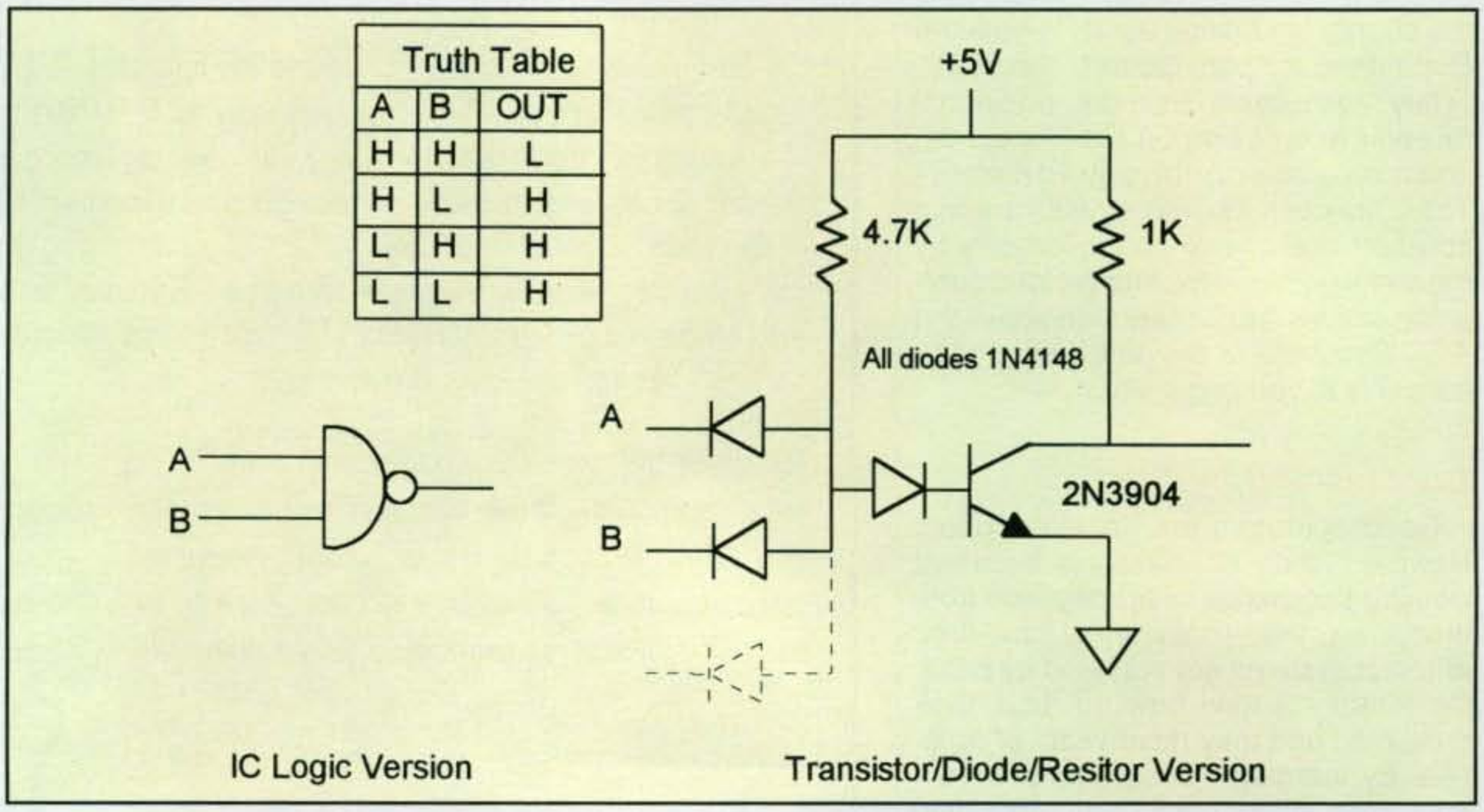

Fig. 2– The NAND gate function.

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Truth Table		
A	B	OUT
H	H	H
H	L	L
L	H	L
L	L	L

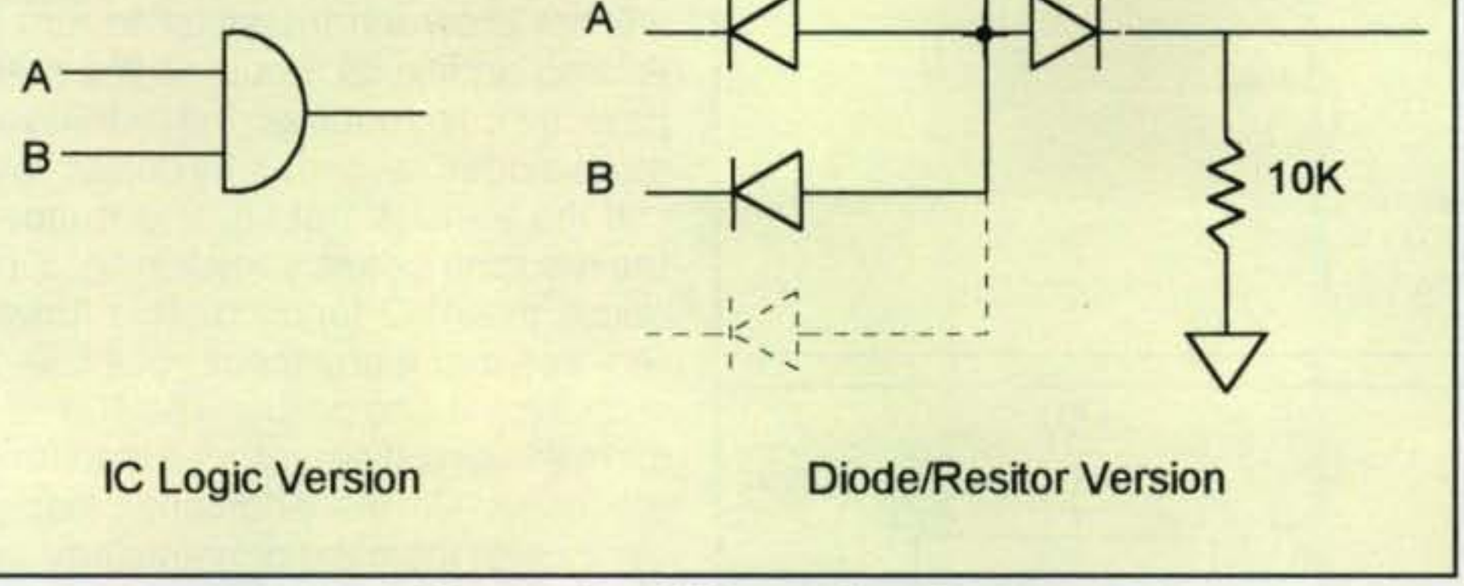

Fig. 3– The AND gate function.

Truth Table		
A	B	OUT
H	H	H
H	L	H
L	H	H
L	L	L

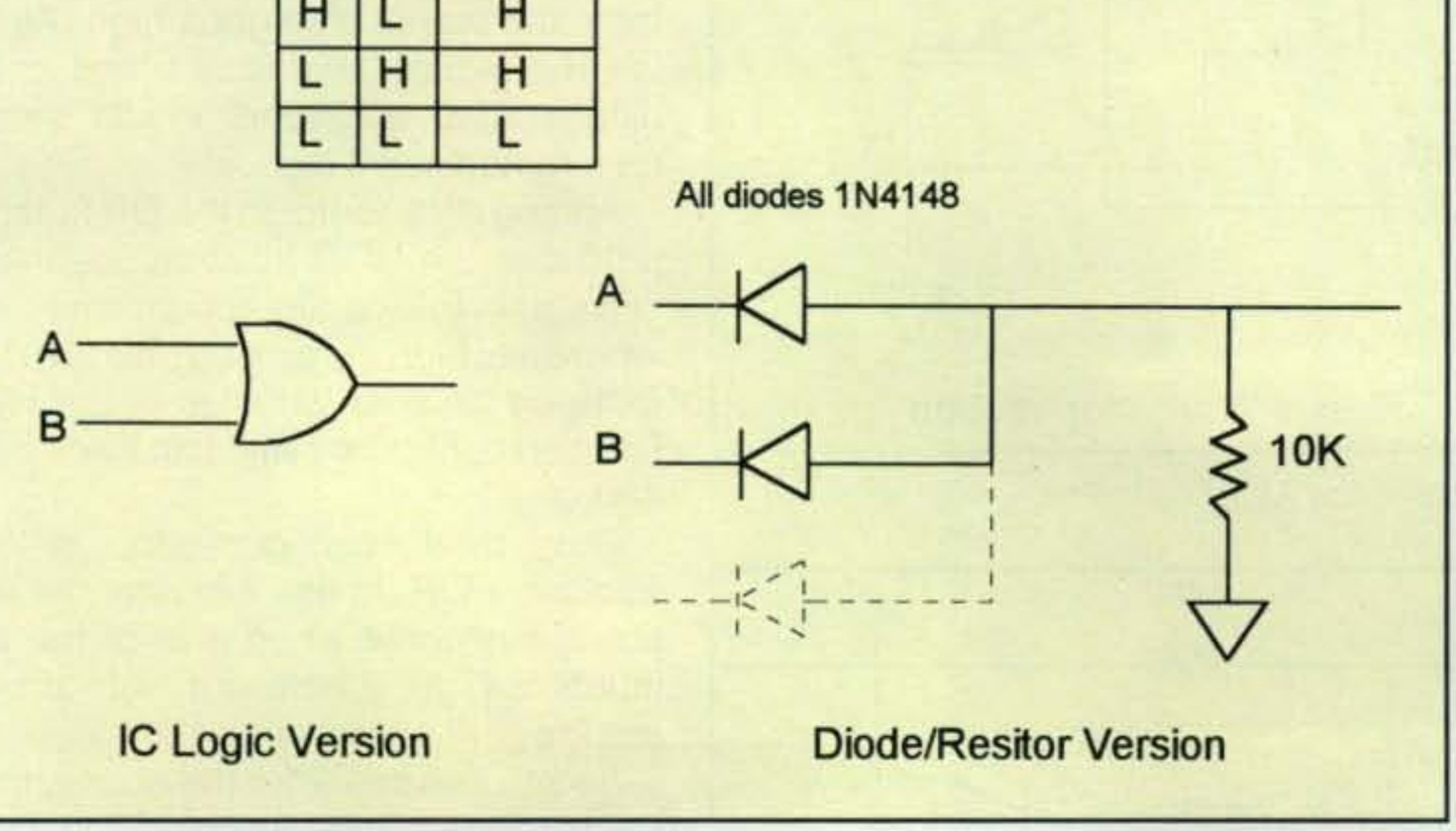

Fig. 4– The OR function, which is the opposite of the AND function.

resistors, and diodes are needed, and all circuits can easily be bread-boarded to gain actual hands-on experience.

Fig. 1 is the most basic digital logic function, the inverter (or NOT circuit). The logic representation shows the IC approach, while the schematic shows a resistor/transistor version. Referring to the truth table, you can see that when the input is high (logic 1) the output will be low (logic 0), and vice versa. The 100K resistor shown from the input to ground is optional. It is only used when the input to the base will be left floating to be sure that the transistor will stay cut off. The operating speed of this inverter, by the way, is pretty much determined by the speed of the transistor used and the values of the resistors. With 2N3904s and 1K resistors (as shown), speeds well into the megahertz region can be achieved.

Fig. 2 is the NAND gate function. In this case, the logic output is low only

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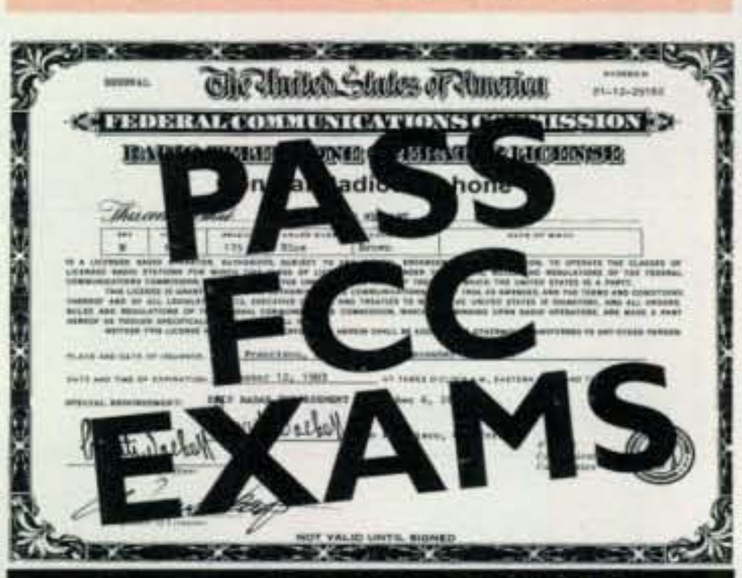

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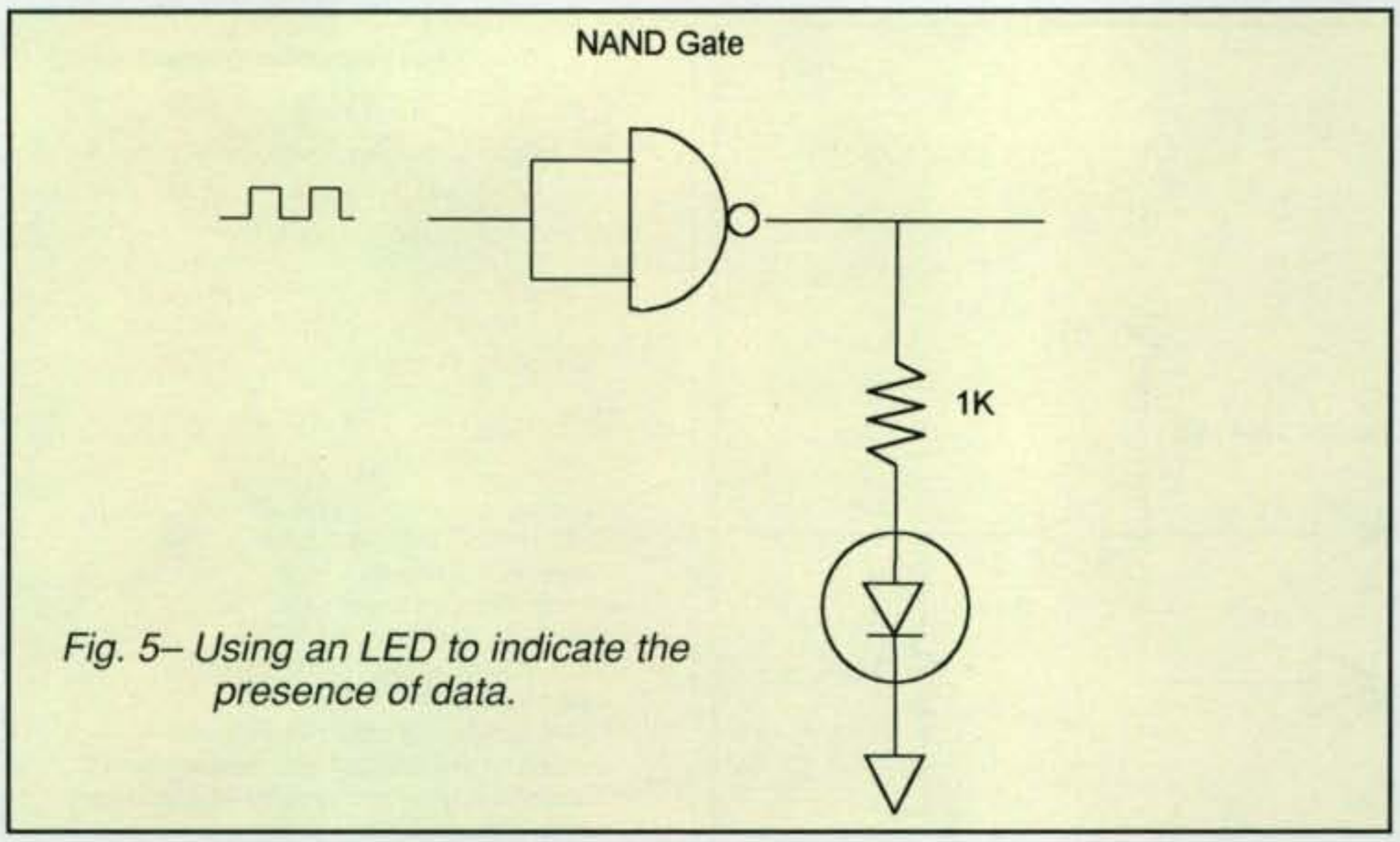

Fig. 5– Using an LED to indicate the presence of data.

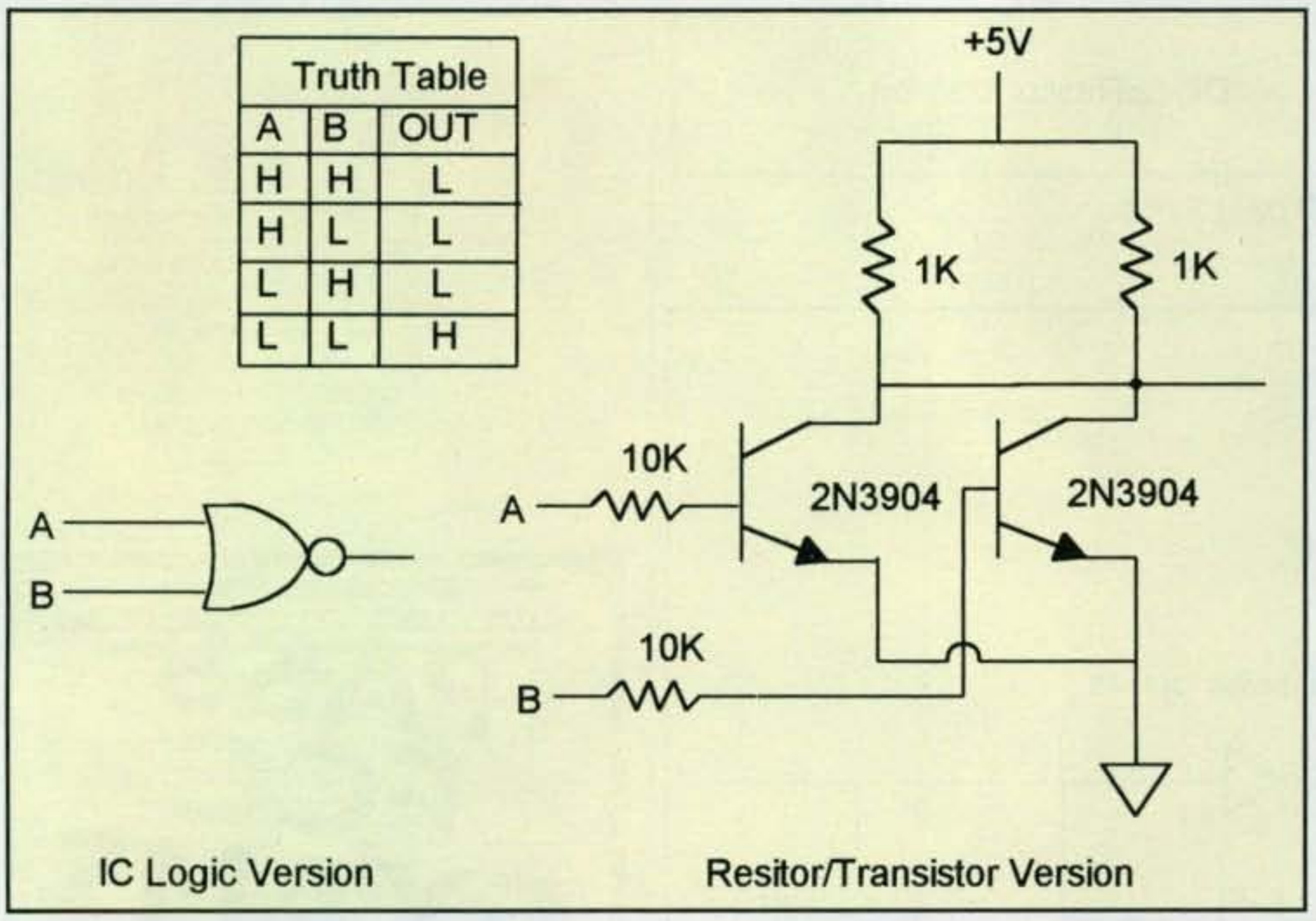

Fig. 6– Another variation of the NOR function.

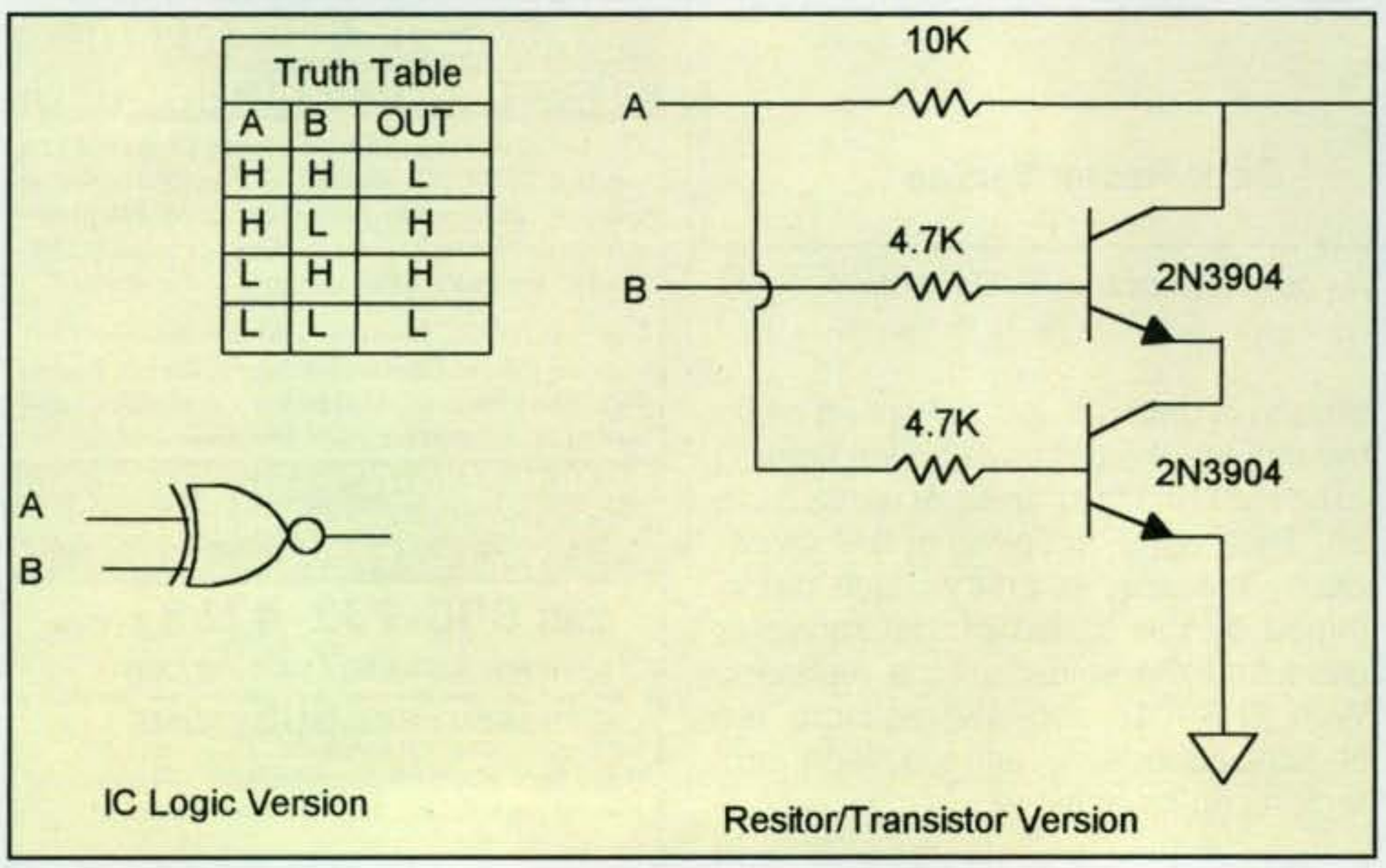

Fig. 7– The Exclusive OR function.

when both inputs are high. Any other combination leaves the output high. In the schematic, both inputs must be high in order for the transistor to conduct, because if any input remains low, the diode connected to that input will conduct, resulting in about 0.7 volts across the diode. The diode connected in series with the base will then drop another 0.7 volts, and the base voltage will be close to, if not equal to, zero. This will not allow the transistor to turn on. Adding additional inputs to the NAND gate simply requires the addition of more diodes (as shown by dotted lines).

If the transistor of fig. 2 is removed, the resulting circuit, shown in fig. 3, produces the AND function. This function requires that if any input goes low, the output must also go low. The 10K resistor in this circuit serves as a load for the diodes, while the additional diode in series with the base prevents any input diode drop from reaching the transistor. Additional AND inputs, as in the case of the NAND gate, simply require additional diodes.

The opposite of the AND function is the OR function, shown in fig. 4. This gate can also be configured with diodes alone. In this circuit, when any input goes high, the output also goes high. Again, the 10K resistor serves as a load for the diodes, and additional inputs simply require additional diodes.

Adding a transistor to the OR function produces the NOR function, as shown in fig. 5. In this configuration, when any input goes high the output goes low. Fig. 6 shows another variation of the NOR function configured with just transistors and resistors.

Our final configuration is the Exclusive OR. In this function, the output is high only when one of the two inputs is high. If both are high or both are low, the output is also low.

As you can see from the above, logic gates can easily be replaced with common components. Although a chip with a combination of gates is usually more compact, when only one gate is needed the circuits shown may well "save the day." As also mentioned, speed is a function of the components employed. However, the circuits shown will operate into the megahertz region as well as actually interface with most popular logic families. The circuits shown can also be connected to one another when required, or used simply to learn about the behavior of the various functions.

73, Irwin, WA2NDM

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BY BOB JOSUWEIT,* WA3PZO

Hams from MARS Help Military

Three years ago this month, America was under attack in New York City, Washington, D.C., and western Pennsylvania. The events of September 11th changed not only our views on terrorism, but also the way we respond to a disaster. This year the threat of terrorist activity is high as we go through the electoral process.

One of the first groups that responded to the attack on America on September 11th was the Military Affiliate Radio System (MARS). Let's look back at their response that fateful day and also look at some of their training—to be ready at a moment's notice.

They're hams, they're civilians, but to participate in the U.S. Army Reserve's countrywide exercise in June these five members of MARS donned uniforms that facilitated their support operation at Ft. George G. Meade in Maryland. John K. Scoggin, Jr. (left), a volunteer from Wilmington, DE, brought his MARS Emergency Communications Unit to Ft. Meade, where it connected MARS members in 50 states with the headquarters of Operation Grecian Firebolt 2004, the biggest MARS exercise ever. Next to Scoggin (left to right) are MARS members Justin Kates (Lewes, DE); Robert Sutton, Chief Army MARS (Ft. Huachuca, AZ); John DiGiovanni (Wilmington, DE); and Robert Hollister, Army MARS

Looking Back

A nation watched in horror and disbelief as the World Trade Center's twin towers in New York City crumbled to the ground, trapping thousands in the buildings as well as rescue workers on the ground. As school children and workers rushed home to be with their families, many amateur radio operators were providing emergency communications as cellphone towers were destroyed and circuits were overloaded.

With major incidents occurring within 200 miles of one another and major cities being assaulted by terrorists, one of the federal government's many concerns was keeping in touch with all of its agencies and offices across the nation.

Within 15 minutes of the first crash, the first of many emergency information messages had been transmitted by a Military Affiliate Radio System (MARS) member to the Pentagon. Within an hour, a coast-to-coast backup net was forming. The Army MARS assignment is "Preparing for the Worst."

The initial call for assistance came from the National Communications System in the Department of Commerce. The NCS assists the President, the National Security Council, and others in the coordination and planning for national security and emergency-preparedness communications for the federal government under all circumstances, including crisis or emergency, attack, and recovery. An e-mail alert just before 10 AM EDT (about one hour after the initial plane crash into the World Trade Center) ordered NCS participating stations to operational level 2, "emergency potential exists." The alert, said the NCS message, "is requested by the FBI, the National Coordinating Center for Telecommunications, and the General Services Administration."

This activated a national coordination net. By 2 PM more than 200 stations had checked in. Among the participants were Federal Emergency Management Agency (FEMA) outposts, FAA offices, the American Red Cross and state emergency operations centers, as well as the MARS members enrolled in SHARES, the HF "Shared Resources" program of the NCS.

A general alert to all MARS members came soon afterward from Army MARS headquarters at Ft. Huachuca, Arizona, and then came a formal request for assistance from FEMA.

From Essex County, New Jersey, Bill Fitzsimmons, N2LMU (Army MARS call AAR2CB), was on the air within sight of the plume of smoke over the World Trade Center. Fitzsimmons not only joined the SHARES net but also operated the MARS Region 2 digital gateway (covering NY/NJ), relaying emergency traffic—including the

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first bulletin on the crash—to higher headquarters.

The bulletin was aired within a few minutes by David Popkin, W2CC (AAA2NJ), the New Jersey state MARS director. He lives in Englewood, just across the George Washington Bridge from Manhattan. By the end of the operation Popkin had initiated 28 "essential elements of information" status reports. These types of status reports include information on the incident, status of emergency medical facilities, local transportation status, general damage characteristics, area utility status communications, information source/time of information, and comments.

Jeffrey Bixby, W4BIX (Air Force MARS call AFA2EA), of Arlington Virginia, close to the Capitol, offered his mobile station for use when it became known government buildings were being evacuated. Army MARS Chief Bob Sutton, N7UZY (MARS call AAA9A), credited Army MARS members with initiating 49 "essential elements of information" reports for use by Pentagon planners, including early damage and transportation status reports.

MARS Trains To Be Ready

MARS conducted its largest communications exercise in June as part of Grecian Firebolt 2004. Grecian Firebolt supports a critical homeland defense initiative by building capacity among federal, military, and civilian partners to tactically communicate across a range of divergent technologies. It also tests the capability of active, reserve, and National Guard units to operate in a joint environment providing command, control, communications, and computer support during wartime.

During Grecian Firebolt units from across the United States sent secured and unsecured communications using cell phones, computers, land-line phones, tactical field phones, video, and other analog and digital devices. Throughout the two-week exercise, they supported communications for four other large-scale exercises based around the country and involving quartermaster, medical, chemical, and National Guard Army and Air Guard units.

The technologies tested during Grecian Firebolt have been used in theaters of operation around the world, such as Afghanistan and Iraq. This exercise also continues to build interconnectivity between the military and its federal, state, local, and private-sector partners for Homeland Defense initiatives. The multi-purpose Homeland Defense/Homeland Security exercise

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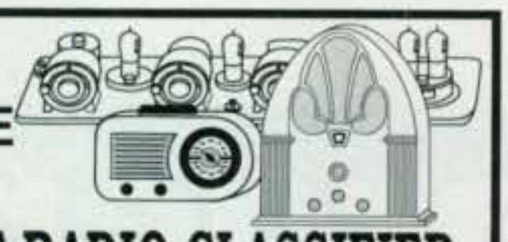

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included the development and processing of Essential Elements of Information (EEI) report messages throughout the MARS radio network. Participants interfaced with selected military locations via HF radio, and tested and evaluated new technology such as HF radio with Automatic Link Establishment (ALE). The Institute for Telecommunication Sciences says, "ALE is a robust, adaptive HF radio method for automatically establishing communications over HF single sideband (SSB) links. Using ALE, an operator or computer-initiated control signal can automatically initiate point-to-point or point-to-multipoint calls. The ALE controller can be programmed to scan one or more frequencies, pick the best frequency for operation, and switch to voice or data operation immediately upon link establishment."

In addition, MARS members established an HF radio link with FEMA, the National Communications System's interagency emergency message-handling system (SHARES), and the National Guard Bureau (NGB). A MARS management team from Ft. Huachuca, Arizona was deployed to Ft. Meade, Maryland.

Evaluation

The exercise was still being evaluated as we went to press. However, Chief Robert Sutton said, " . . . that this was not only the largest exercise in MARS history and one of the best planned and executed was both exciting and truly a combined service integrated event. In simple words, the challenge presented to MARS was successfully met and the bar was raised one more time."

MARS on Wheels

John Scoggin, W3JKS, a member of the chief's special staff, brought his Emergency Communications Unit (ECU) from Delaware to the 311th Theater Signal Command (TSC) at Ft. Meade. With the assistance of other volunteer MARS members, a number of antennas were erected and the MARS operations cell was established as the MARS exercise Emergency Operations Center. MARS members from all three services simulated terrorist acts across the United States and other countries and routed EEI and other message traffic through the MARS radio network to the ECU at Ft. Meade. More that 1200 Army MARS EEI and other MARS reports from MARS members in the field were funneled via the MARS radio network to the ECU. According to the chief, "It was obvious that other MARS exercises since last year's Grecian Firebolt have resulted in better trained members."

Around the World

The exercise involved MARS members in the continental United States, Alaska, Hawaii, Puerto Rico, the Virgin Islands, and Germany. Additional Army MARS members in Italy, Iraq, Greece, Kuwait, and Belgium also participated. Many technologies were tried during the exercise, including e-mail, web, and voice-over-IP services. MARS members worked on systems to interface with local police, fire, and emergency-management agencies. They also tested crossband operations in New York with several Amateur Radio Emergency Service (ARES) units.

In summary, Grecian Firebolt provided MARS members with the opportunity to work closely with the 311th TSC as part of their team, link with other agencies and military units, and experiment with new technologies within MARS. It gave MARS an opportunity to display its capability of supporting the military and other government agencies as part of Homeland Defense and Homeland Security.

National Special Security Events

Three major events have been designated National Special Security Events (NSSE). These include the 30th G8 Summit at Sea Island, Georgia; the Democratic National Convention in Boston; and the Republican National Convention in New York. When an event is designated as an NSSE, the United States Secret Service assumes its mandated role as the lead agency responsible for security design, planning, and implementation.

The G8 Summit brings together the leaders of the world's major industrial democracies: Canada, France, Germany, Italy, Japan, Russia, the United Kingdom, and the United States. The European Union also attends the G8 Summit, represented by the president of the European Commission and the leader of the country holding the presidency of the European Council. At previous summits, leaders have discussed a wide range of international economic, political, and security issues.

Several of the G8 meetings have attracted violent protests. In addition, an attack by terrorists led to an extreme level of security and preparation by federal, state, and local authorities. According to ARRL reports, Chatham County Emergency Management requested that members of ARES staff six locations in

the Savannah area around the clock for the duration of the summit. Hams from around the state responded to the call. Hams also were stationed at the Multi-Agency Command Center at McKinnon Airport on St. Simons Island. According to reports, the hams' mission was to provide back-up communications in the event of "whatever" and to monitor various frequencies and gather intelligence on anything of a suspicious nature.

Political Conventions

As we go to press, Boston area amateur radio operators are making preparations to support the American Red Cross, Salvation Army, and Massachusetts Emergency Management Agency during the Democratic National Convention. According to Eastern Massachusetts ARRL Section Emergency Coordinator Michael Neilsen, W1MPN, the goals during the convention were to:

1. Provide requested support services during the course of the convention that are consistent with our abilities and resources.

2. Provide needed support in case of catastrophic loss of the communication infrastructure due to a terrorist incident.

3. Provide needed support in case of catastrophic loss of the communication infrastructure due to natural catastrophes.

4. Optimize training opportunities during the limited mobilization:

a. Exercise Recall Lists

b. Practice radio check-in and resource operations

c. Set up schedules to encourage "mini-ARESMATs" in support of Red Cross operations during the week of DNC operations

d. Operate ARES dedicated stations in support of the ARES leadership, including two locations for the Incident Command Post (ICP) and alternate.

e. Provide adequate NCM and NCS assets

5. Respond to emergency conditions:

a. Implement "Shelter-in-Place" doctrine

b. Check into appropriate net

c. Be prepared to mobilize as directed by ARES leadership; supporting "in-disaster" and "post disaster" operations as per our doctrine.

d. Mobilize to staging locations (areas) for coordination, briefing, and deployment

e. Plan for increased tempo of operations using a prearranged plan

f. In-process deploying hams from outside the section

g. Institute appropriate Continuation of Operations Plans as required.

6. Implement Incident Command System (ICS) procedures in operations and planning. Use by other ARES members beyond the senior leadership is not expected at this time.

The American Red Cross requested that amateur radio operators staff chapter offices in Boston and Waltham. Hams who supported other agencies, such as the Salvation Army, were told they would be mobilized if needed. Additional hams were asked to standby just in case.

As with the G8 Summit, there were a lot of operators standing by just in case. It is hoped that Boston was just as quiet. A quiet event leads to quite a bit of time during which hams sit, watch, and wait. While it may not be exciting or glamorous, the agencies we serve view this stand-by and limited deployment by us as providing them with a huge advantage in case something does happen. Neilsen says, "Moreover, serving in this capacity at these agencies' request gives us tremendous credibility with their organizations and is greatly appreciated. We ask that those who deploy to the served agencies bring a book, game, or something to entertain them during this potential for large periods of 'down' time."

The ARES staff planned to utilize the convention as a great training opportunity to practice an ARES-MAT, fine-tune net-control skills during regular call-ups of nets every few hours, and pass routine NTS status traffic messages. At the time of this writing, no information had been released about amateur radio participation during the Republican National Convention in New York City.

Until Next Month . . .

This month we took a look at a large military exercise that involved MARS members. Many of the MARS operators are hams, like you and me. They have chosen to support a unique form of public-service communications. Two sites with additional information on HF ALE operations are: <http://www.its.bldrdoc.gov/pub/oa-rpt/hf-ale/handbook/> and <http://www.tactical-link.com/ale_ info.htm>.

We also looked at some major events where the event went well and hams stood by just in case. Often callouts are not exciting, but in the eyes of emergency management officials, hams provide a very valuable service.

Do you have a story to tell? Sometimes an event doesn't involve a disaster, but your efforts show amateur radio helping in the public interest. Drop us a note and let us know what you are involved with.

73, Bob, WA3PZO

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What You've Told Us...

Our July survey asked for your views on the FCC's proposal for HF Novice band "refarming" and other issues. By more than a 2-to-1 margin, the readers who responded favored the proposal to eliminate the distinct HF Novice/Tech-Plus CW subbands and give Novices and Technicians with code credit access to the full General Class CW segments on 80, 40, 15 and 10 meters (61% agreed or strongly agreed; 30% disagreed or strongly disagreed; 7% weren't sure and 2% didn't answer).

There was even more agreement with the FCC proposal to use parts of the "old" Novice bands to expand voice segments on 80, 40, and 15 (64% agreed or strongly agreed; 29% disagreed or strongly disagreed; and 5% weren't sure), but many of you didn't like the idea of reducing the size of the exclusive Advanced and Extra Class voice segments as part of the package (53% disagreed or strongly disagreed, while 37% agreed or strongly agreed and 7% had no opinion). It should be noted that 73% of the survey respondents hold Advanced or Extra Class licenses.

There was less certainty about a proposal to permit auxiliary operation on 2 meters, to allow things like Kenwood's "Sky Command" system, which lets you use a dual-band FM rig to control and operate an HF transceiver at another location. On that question, 42% were in favor, 32% were opposed and 24% weren't sure. Finally, we asked your views on the FCC's plan to again permit the commercial manufacture and sale of RF power amplifiers that can operate on the 12 and/or 10-meter bands. A majority of you (54%) supported this idea while 34% opposed it and 11% weren't sure. An FCC decision on the proposal is expected in the next few months.

This month's free subscription winner is Richard Baker, K4WFS, of Rainbow City, Alabama.

Reader Survey September 2004

We'd like to know more about you—about who you are, where you live, what kind(s) of work you do, and of course, what kinds of amateur radio activities you enjoy. Why? To help us serve you better.

Each time we run one of these surveys, we'll ask a few different questions and ask you to indicate your answers by circling numbers on the Survey Card and returning it to us. As a bit of an incentive, we'll pick one respondent each month and give that person a complimentary one-year subscription (or subscription extension) to *CQ*.

This month, since we're featuring the CW results of our CQ World-Wide DX Contest, we want to find out about your CW (Morse code) operating habits. For those of you with long memories, yes, we asked these same questions three years ago. We want to see what's changed.

Please answer by circling the appropriate numbers on the reply card.

1. How would you classify your proficiency level as a CW operator (choose only one)?

Expert 1
Advanced 2
Intermediate 3
Beginner 4
Don't know Morse code 5

2. What is your level of CW activity versus other modes?

I operate CW exclusively 6
I operate CW most of the time 7
I operate CW about half of my on-air time 8
I operate CW once in a while 9
I rarely operate CW 10
I never operate CW 11

3. Please circle the numbers for on-air activities in which you operate CW *a majority of the time* (left-hand column) and *some of the time* (right-hand column):

Contesting	12		19
HF DXing	13		20
Traffic Handling	14		21
Rag-chewing	15		22
VHF DXing	16		23
Other	17		24
None	18		25

4. What is your *primary* reason for operating CW?

Enjoyment of the mode 26
Its simplicity and efficiency 27
CW operators are better behaved 28
Its ability to get through in marginal conditions 29
Other 30
Don't operate CW 31

5. Do you think you would have learned CW if it was not a licensing/upgrading requirement?

Yes 32
No 33
Don't know 34
Have not learned CW 35

Thank you very much for your replies. We'll be back with more questions next month.

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DR-235T 222 MHz

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DR-435T MkII UHF

FM Mobile/Base Transceiver

There are many reasons you might want a monoband 440 MHz transceiver and the DR-435 is ready for whatever job you have in mind. From working repeaters, UHF satellites, remote command and control, data or simplex voice, and more; you'll find the 100 memories, large alphanumeric display, mic with illuminated keys all well designed to suit your purposes. Packed with features like CTCSS encode+decode, DCS, tone bursts, theft alarm, alphanumeric display, autodial memories, high stability TCXO and more.

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The FCC's Universal Licensing System and How It Works

Are you confused by all the acronyms and gobbledygook associated with the FCC's new online licensing system? You are not alone. This month let's try and sort out the FRN, CORES, licensee IDs, ULS, passwords, and more.

The Universal Licensing System (ULS) is a 21st century answer to the FCC's licensing and research needs. In a nutshell, ULS is an integrated database and automated processing system developed by the Wireless Bureau to facilitate electronic filing of wireless applications, licensing information, and public access to such information for all wireless radio services. ULS enables all wireless applicants and licensees to electronically file all licensing-related applications and other filings, thus increasing the speed and efficiency of the application process.

Up until five years ago, the FCC had eleven different licensee databases—basically one for each radio service. Most application filing was accomplished by mailing a piece of paper to Gettysburg, Pennsylvania, with the information then hand-keyed into the computer system by FCC personnel. Five years ago it frequently took weeks (or months) to get a ham ticket processed and back from the FCC.

Today, electronic filing reduces the time involved for the public to file applications and greatly improves the speed of processing radio licenses and callsigns. Licenses are now granted as

*Chairman, NCVEC Rules Committee
Member, Question Pool Committee
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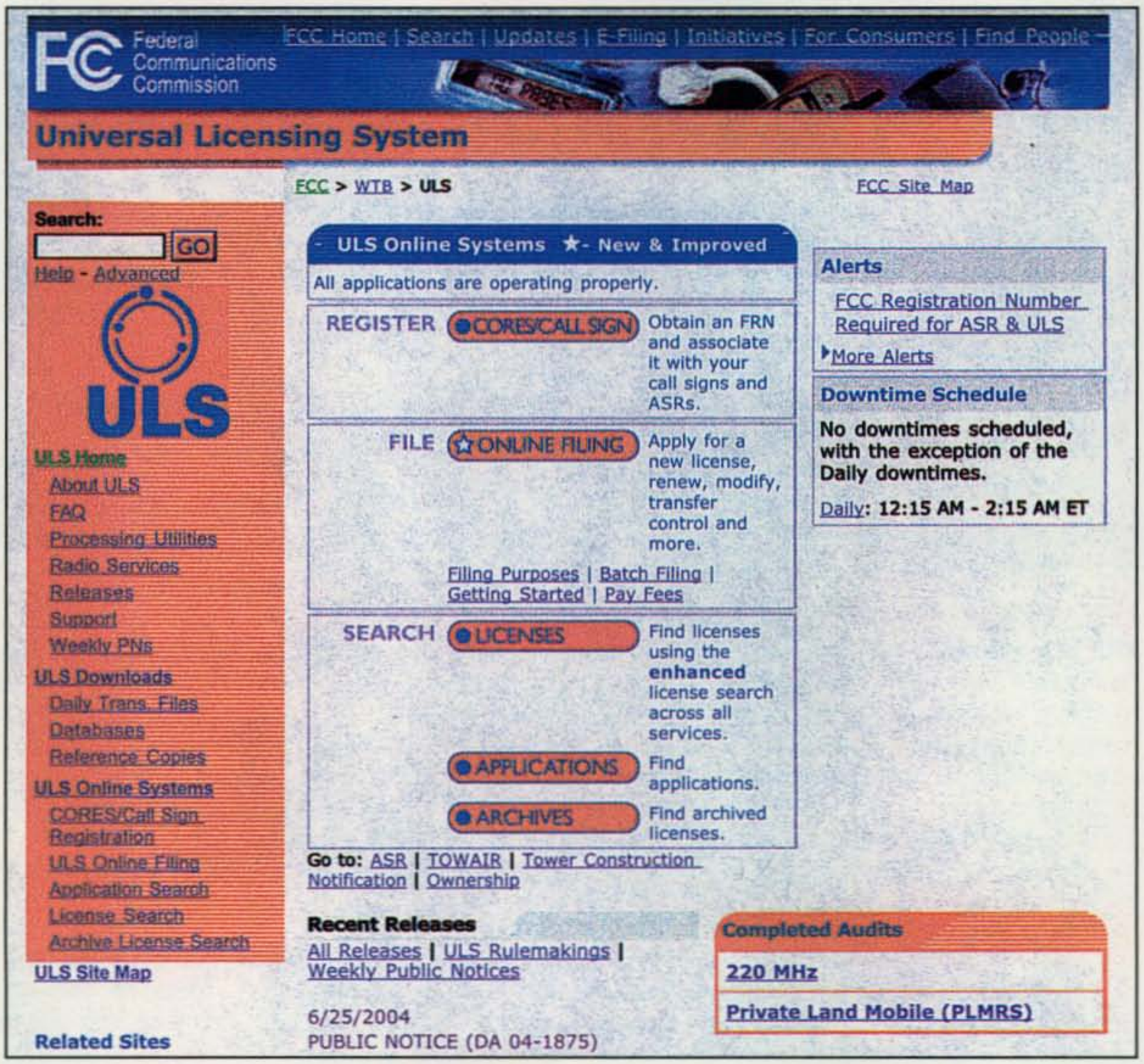

The FCC's Universal Licensing System (ULS) home page at <http://www.fcc.gov/wtb/uls> allows you to sign up for an FCC Registration Number (FRN), search online for existing licenses and pending applications, and renew or modify your license online.

quickly as the information can be submitted to the Commission from a PC. You can even print out your own license almost immediately. Such is the magic age of electronic data processing!

The Beginnings of Electronic Filing

The Wireless Telecommunications Bureau (WTB) began work on the ULS for all its radio services in the mid-1990s. On September 17, 1998 the FCC "...adopted rules that consolidate, revise, and streamline its license application procedures for radio services licensed by the Wireless Telecommunications Bureau (WTB)."

The FCC eliminated nearly 200 duplicative and inconsistent rules in various rule parts and replaced over 40 existing wireless application forms with just five new forms, FCC Forms 601 through 605. The goal was for all wireless radio services to use the same set of forms.

The eleven databases were consolidated into a single licensee database, and the integrated wireless radio license processing system became operational on August 12, 1999. It included all radio service licensees, including amateur radio operators.

The paperless ULS supports electronic filing of wireless applications and licensing information, and provides public viewing and on-line access to this information over the internet using a World Wide Web browser.

FCC Eliminates FCC Forms 610, 610-A, and 610-B

The venerable FCC Amateur Radio application, Form 610, which had been used for decades, was replaced by the multi-radio service FCC Form 605. FCC Forms 610-A (used by foreign amateur radio operators to obtain an alien amateur reciprocal permit) and 610-B (used for club and military station license applications) were also eliminated when the FCC amended the reciprocal, Club, and Military Recreation Station licensing rules.

Reciprocal operation no longer requires a special permit. If you are licensed by a country that has a reciprocal operating agreement with the United States and you are not a U.S. citizen, you are "authorized by rule" to operate here. As a result, foreign operators no longer receive a paper alien reciprocal permit, nor are they limited to a one-year term. The amended reciprocal licensing rules are now covered in Sections 97.5 and 97.107.

Club Station Call Sign Administrators (CSCSA) were established to issue Club and Military Recreation station callsigns (both the W5YI-VEC and ARRL-VEC were appointed). This new procedure eliminated the need for the old FCC Form 610-B, which was used to license ham clubs; see Section 97.(b)(2).

Registering Your Social Security Number

One of the first steps in getting ULS going was for the FCC to register the Taxpayer Identification Number (TIN) and associated callsigns of all licensees in all radio services. For individual ham operators, the TIN is your Social Security Number (SSN). Some ham clubs are incorporated and use their Employer Identification Number (EIN) instead.

The SSN is required by the FCC to be in compliance with the Debt Collection Improvement Act of 1996. All federal agencies are required by law to collect it. The TIN is used by the government to identify applicants for federal benefits who might have outstanding debts with the Federal Government.

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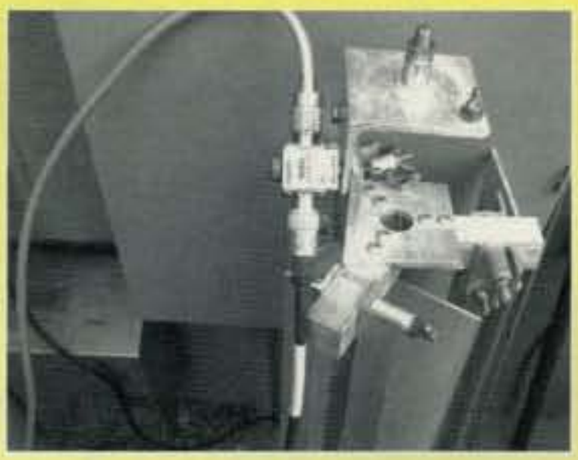

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Applicants and licensees are required to register their TIN with the Commission through ULS. One radio amateur (David Popkin, W2CC) disagreed with that requirement and filed a Petition for Reconsideration.

The FCC pointed out that the DCIA requires collection of applicant and licensee TINs when they "do business" with a Federal agency as a condition to receiving governmental benefits, regardless of whether any fees are collected. The DCIA defines a person "doing business with a Federal Agency" as "an applicant for, or recipient of, a Federal license, permit, right-of-way, grant, or benefit payment administered by the agency...."

Taxpayer Identification Numbers are not available to the public. Instead, another identifying number is made available. The TIN is released by all federal agencies to the U.S. Treasury Department for Debt Collection purposes.

Using the Taxpayer Identification Number and any associated callsigns, the ULS assigns a unique sequential identifying number to each licensee. At first, this number was a seven-digit number Licensee ID beginning with the letter "L." Although Licensee IDs are still assigned by the FCC's Commission Registration System (CORES), they are no longer used. The applicant identifier was changed to an FCC Registration number (FRN) on December 3, 2001.

What is CORES?

Before using ULS to file an application, you must be registered with CORES and receive an FCC Registration Number (FRN). There are three ways to register:

1. To register in CORES electronically, go to <http://www.fcc.gov/wtb/uls> and choose the "CORES/Call Sign" registration link at the top of the page.

2. You may file manually by using a paper TIN Registration form, FCC Form 606. This can be obtained from the FCC's Fax-on-demand system by calling (202) 418-0177 from the handset of a fax machine or by calling the FCC's Forms Distribution Center at (800) 418-3676.

3. The third way is to have a VEC automatically obtain your FRN for you as part of the electronic application filing process. All applicants provide their SSN to the VEC System when they are examined, or when a Volunteer Examiner Coordinator (VEC) files a license renewal or modification on their behalf. The ULS program registers their licensing information and SSN in CORES and an FRN is automatically generated.

During the last five years most radio amateurs have been automatically registered (and FRNs generated) when a license application is electronically filed by a VEC. Thus, if you have previously filed an application with the Commission through a VE team or VEC, you have been assigned an FRN and password. The fact is, more than 95% of all licensed amateurs already have an FRN.

If you do not wish to provide your SSN to a VE or VEC, then you only have one choice. You must pre-register with the Commission Registration System (CORES) and get your own FRN before you can be examined or get your license renewed. You then simply use your FRN in place of your Social Security Number on the application form. Applicants who refuse to provide their SSN to the FCC may not be examined for a new or upgraded license, nor can their licenses be modified or renewed by the FCC (directly or through a VEC).

Once you have registered in CORES, you must return to ULS and associate any existing callsigns you have with your new FRN. You will find a link to do this at the bottom of the online CORES registration form. Your callsign is automatically associated with your FRN if it was registered by a VEC as part of an application filing.

What is an FRN?

The FCC Registration Number (FRN) is the 10-digit identification number assigned by the Commission to all entities (individuals, organizations, and corporations) that transact business with the FCC. It must be provided any time an FCC application is filed in ULS.

All licensees with existing licenses were registered by the FCC in the new ULS database prior to December 3, 2001. If the FCC had their TIN, they were issued an FRN. You can locate your FRN by accessing any of the online callsign databases (including Hamcall.net, QRZ.com, and ARRL.org) or you can search by your callsign in ULS License Search. This is accessible from the FCC's online ULS home page located on the web at: <http://www.fcc.gov/wtb/uls>. Your FRN will appear in your license record.

What is My ULS/CORES Password?

In order to access ULS and file applications, you need your password. Passwords are either automatically assigned by the CORES registration system or the applicant during the registration process. Applicants who had their FRN and password assigned by CORES are notified of this information by letter.

If you had a password for ULS prior to 2001, you may still use it. Passwords must be between 6 and 15 characters in length. If your password was less than 6 characters, you need to add the required number of asterisks (*) until there are 6 characters.

If you know your FRN, but don't know or have lost your password, contact WTB Technical Support by telephone at (877) 480-3201 and they will provide it.

Your FRN and CORES password are very important, since they are the keys that unlock the Universal Licensing System. You can't file an application or license modification in ULS without them. You can change your password at any time by logging into CORES registration.

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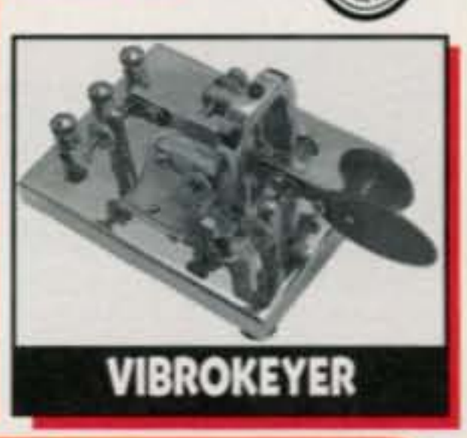
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May I Still File a Paper Form?

No manual (paper) forms are required if you file online with ULS, and almost all application filing is now done electronically using a personal computer. The FCC mandates that the VECs file only electronically. Individual amateur radio, GMRS, ship and aircraft, and Commercial Radio operators, however, have the option of filing electronically or manually—that is, by submitting a paper form.

If you are one of the very few who does not have a PC or chooses to file manually, you can either submit an FCC Form 605 to the Commission or an NCVEC Form 605 to a VEC. You can download the needed FCC form 605 and instructions from the Commission's website at <http://www.fcc.gov/formpage.html> or request forms by phone at (800) 418-3576, fax on demand at (202) 418-0177, or in writing. The current version of the FCC Form 605 is dated December 2003. Previous editions may not be used.

Needless to say, it takes a great deal longer if you file a paper form, since its handling reverts to the old manual-input system! Also, it is much more confusing, since the instructions on using FCC Form 605 apply not only to Amateur Radio, but the Ship, Aircraft, Restricted and Commercial Operator, and General Mobile Radio services as well. Much of the instructions simply do not apply to amateur radio.

The NCVEC 605 is a single-page form that was authorized to be designed by the VECs for filings that can be accomplished by a Volunteer Examiner Coordinator. These include name, address, and systematic callsign changes, as well as new licenses and renewals.

The NCVEC Form 605 is available from any local VE team or on the web by downloading from <http://www.arrl.org/arrlvec/ncvec605-3.pdf>. The NCVEC Form 605 must be forwarded to a VEC and may not be sent directly to the FCC. There is a small fee to the applicant if the filing is handled by a VEC. Amateur applicants who prefer not to pay charges imposed by the VEC may, if they so choose, renew or modify their licenses themselves manually or electronically.

What is the Status of My License or Application?

Whether you have filed electronically or manually, you can quickly determine the status of your application through the ULS Application Search or ULS License Search. These search engines require that you input either your callsign, name, or FRN to access your record. Both search engines can be accessed from the ULS home page at: <http://www.fcc.gov/wtb/uls>. It generally takes 24 hours for new information to show up in ULS.

Another very handy FCC website is the ULS Licensing Support Center located at <http://esupport.fcc.gov>. This "one site does all" interface helps you to register FRNs, reset passwords, search for ULS application status and license data, associate FRNs with callsigns, and much more.

In an upcoming column we will once again cover vanity callsigns and how to get them. A vanity callsign is an amateur station callsign selected by the user. It appears that many ham operators would like to get a specific callsign but aren't sure what is involved, and a *lot* is involved. Only certain callsigns are available to an applicant, and the filing process which requires multiple forms can be very complex. See you next month.

73, Fred, W5YI

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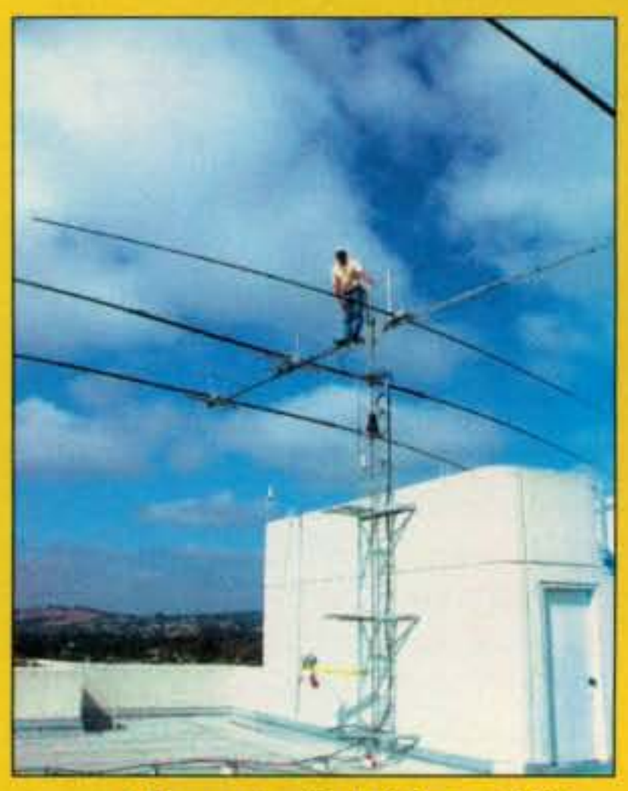

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how it works

BY DAVE INGRAM,* K4TWJ

A Simplified Introduction to FM

As most of our readers will agree, FM is one of today's best known modes of electronic communication. Indeed, a great number of new licensees begin their ham radio lives on 2-meter and 70-cm FM, and a creditable number of test questions on both amateur and commercial radio exams also relate to FM. In light of that fact, this month's column presents a "keep it simple" discussion of FM: why it is so popular, its basic operating concepts, and how repeaters extend FM communications range. We will also look at the differences among AM, SSB, and FM—and how FM does not respond to noise—and hopefully give you a better understanding of this mode.

Photo A– Looking for help acquiring or upgrading your amateur radio or commercial license? Want to learn more about electronics overall? You can't miss with Gordon West's licensing manuals and various study materials available from the W5YI Group at <www.w5yi.org> or 1-800-669-9594. They are tops in class and number one in producing passing exam results.

In reviewing FM-associated questions on various license exams for this month's column, I also rediscovered the outstanding study guides and materials written by our good friend Gordon West, WB6NOA, and available from the W5YI Group, Inc. (photo A). Gordon's manuals are very concise, with highlighted key words and explanations for each correct answer, addresses of helpful websites for more details, illustrations, charts, and plenty of good handholding encouragement for passing tests. His Tech, General, Extra, and Commercial General Radio Operator license manuals are right up to date, and the W5YI Group's supporting electronics study books are comparable to a top-of-the-line correspondence course. Whether you are looking to get your first license, upgrade, or renew your license—and/or searching for educational materials and guidance—Gordon and the W5YI Group are good folks to know. You can reach them at 1-800-669-9594 or via <www.w5yi.org>. Now let's talk FM!

The Whys of FM

Since FM is a rather wide-bandwidth and high-current mode, and since conservation of radio spectrum plus long battery life are important issues of the time, you understandably may ask why FM (and particularly 2-meter FM) has acquired such popularity. Simply (and non-technically) explained, handheld 2-meter talkies and mobile transceivers are small, inexpensive, and easy to use and represent the most convenient route into our great hobby/service (photo B). These mini-rigs are quite attractive for on-the-spot use (especially during inclement weather), and 2-meter FMing is the perfect way for new licensees to meet other local-area amateurs. It also offers some captivating challenges and capabilities for our creative-minded friends. A couple of low-orbiting OSCAR satellites, for example, presently carry 70-cm to 2-meter FM repeaters. By using two monoband rigs or a full-duplex dual-band FM talkie, you can contact other amateurs nationwide (and farther!). Describing these satellite activities is a full article on its own (more information can be found at <www.amsat.org>), but the facts are clear: VHF and UHF FMing has some exciting aspects in its favor!

*4941 Scenic View Drive, Birmingham, AL 35210
e-mail: <k4twj@cq-amateur-radio.com>

The Operational Concepts of FM

Over the years, several methods have been utilized to superimpose intelligence on a transmitted signal, and each method has its own distinct characteristics (fig. 1). In the case of CW, a telegraph key is used to switch a transmitter's output signal on and off to send Morse code. On AM, the voltage and current powering a transmitter's output stage are varied at an audio rate, so the output signal varies in level, or amplitude, at an audio rate. On SSB, the transmitter's output also varies at an audio rate, but its carrier and one of the two sidebands are removed to leave only one—a single sideband. In FM, the transmitter's output is held constant, and the component or stage controlling the transmitter's carrier frequency is varied at an audio rate. If the modulating frequency is a 500-Hz tone, for example, the transmitter's carrier will swing above and below its center/resting, or "no modulation," frequency at a 500 times-per-second rate. If the modulating frequency is a 1000-Hz tone, the transmitter's carrier will swing above and below its center/no-modulation frequency at a 1000 times-per-second rate, etc. The louder the volume of a modulating tone (or tones), the greater the amount of carrier swing; the

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lower the volume of modulation, the less the resultant carrier swing. Obviously, a low level of modulation makes an FM signal sound weak in audio, while an excessive amount of modulation causes excess frequency swing or deviation and makes a signal sound distorted like it is "cracking."

The previously mentioned terms and measurements are also incorporated into license exams. Here are some examples: *Modulating tones determine the rate of frequency swing* (above and below an FM signal's center/resting frequency), while *the volume or amplitude of those tones determine the amount of frequency swing. The relation between modulating tones and frequency swing is referred to as the modulation index* (for average values) *or deviation ratio* (for maximum or peak values). The formulas shown in fig. 2 are used to calculate frequency swing or deviation, modulating tones or frequencies, and modulation index or deviation ratio. If an FM transmitter produces a maximum carrier swing or deviation of 5 kHz when modulated with a 3-kHz tone, the deviation ratio is 5 divided by 3, or 1.67. If an FM transmitter produces a carrier swing or deviation of 6 kHz when modulated by a 2-kHz tone, the modulation index is 6 divided by 2, or 3.

Since information is conveyed on FM by frequency variations rather than amplitude variations, FM is less susceptible to nose than CW, AM, or SSB. In fact, FM receivers include a *limiter* circuit to help minimize amplitude variations or noise on tuned-in signals. Some FM receivers still pick up lightning static, true, but a good limiter will prevent it from "blasting out" like it does on an AM or SSB receiver.

Hopefully, our above brief explanations helped demystify some of the basic operational concepts associated with FM. Now let's shift focus to highlight some "taken for granted but always worthy of reiterating" notes.

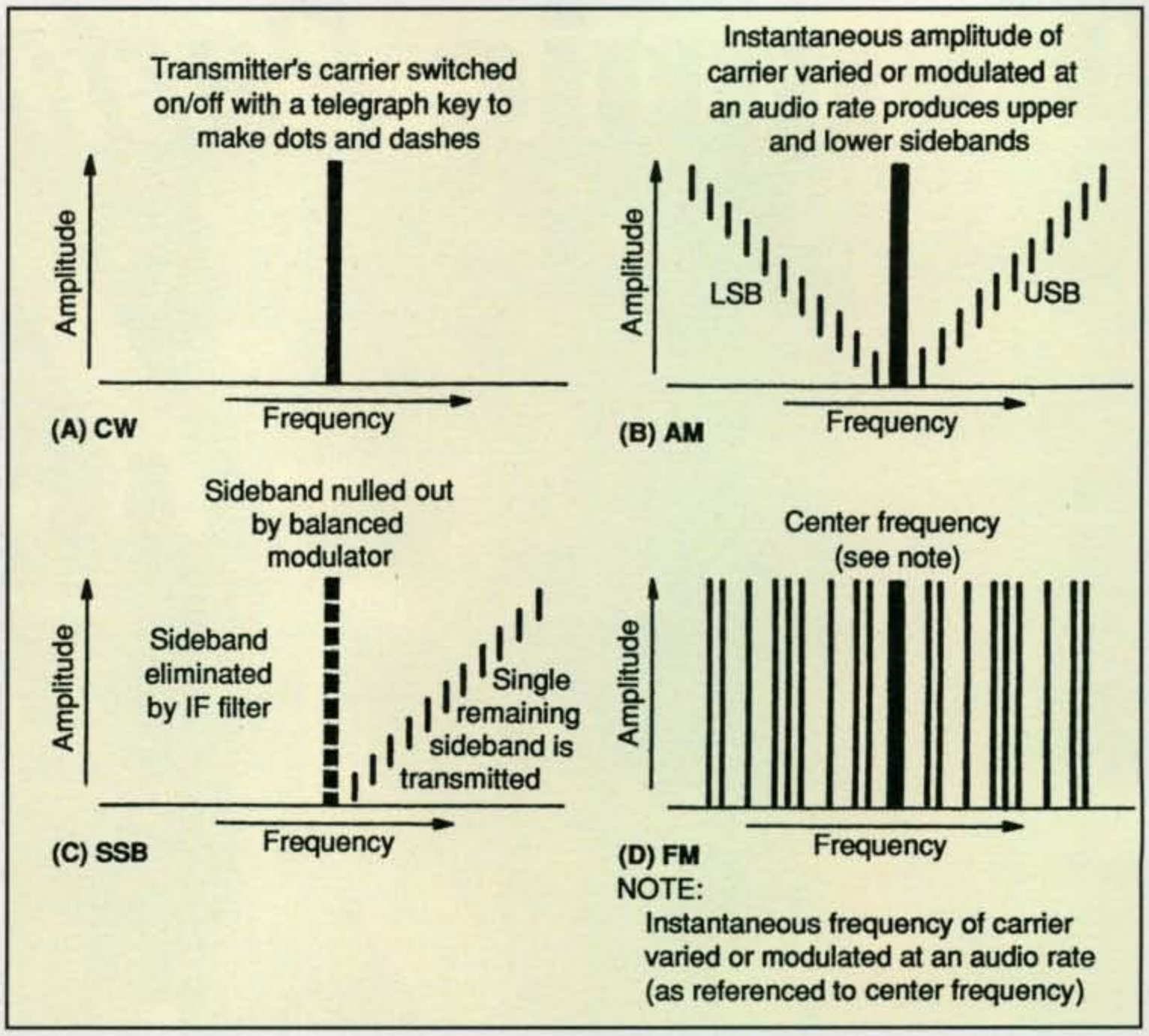

Fig. 1– Simple frequency-versus-amplitude comparison of CW, AM, SSB, and FM. (Discussion in text.)

The Case of Range

A fair number of newer amateurs have asked me why FM seems limited to local-area communications, while other modes such as CW, AM, and SSB can travel thousands of miles and cover the whole world. Such questions may seem unusual or academic to knowledgeable "old pros," but remember many new-generation amateurs grew up listening to commercial (88–108) FM radio and no one ever told them low frequencies such as 550–1750 kHz skip nationwide at night. Yes, and the answer to questions of range was also in the previous sentence.

Communications range is related to utilized frequencies rather than modes of operation. FM is a broad-bandwidth mode as compared to SSB or CW, so it is transmitted on upper frequency bands, while narrower modes such as CW and SSB are transmitted on lower bands. In addition, the upper bands can be reallocated and reused every 200 or 300 miles, while lower bands/frequencies reflect off the Earth's ionosphere and "skip" into distant lands quite easily. If FM was transmitted on HF, it too could span the globe (the 29.550–29.700 MHz FM range of 10 meters is proof of that capability during years of high sunspot activity).

The VHF and UHF bands still have their special benefits, however. They typically exhibit somewhat better line-of-sight or ground-wave coverage than HF and bounce, or reflect off, various structures to yield better coverage in crowded cities. Repeaters are also quite beneficial for enhancing FM communications range on VHF and UHF and produce a friendly "neighborhood on the air" atmosphere.

Repeaters Simplified

Newer amateurs can easily become confused over how FM repeaters work,

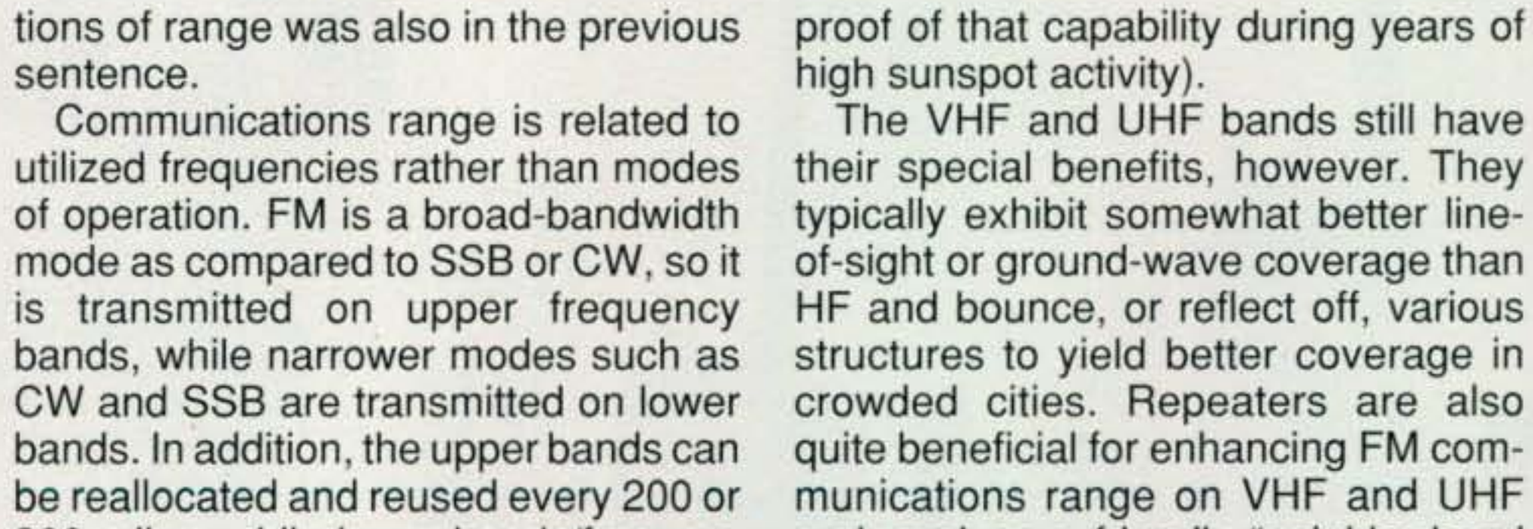

Fig. 2– Formulas for calculating modulation index, deviation ratio, modulating frequency, and amount of frequency swing as discussed in the text. These circle formulas are used just like Ohms Law. Just cover the unknown variable and perform the indicated function/calculation.

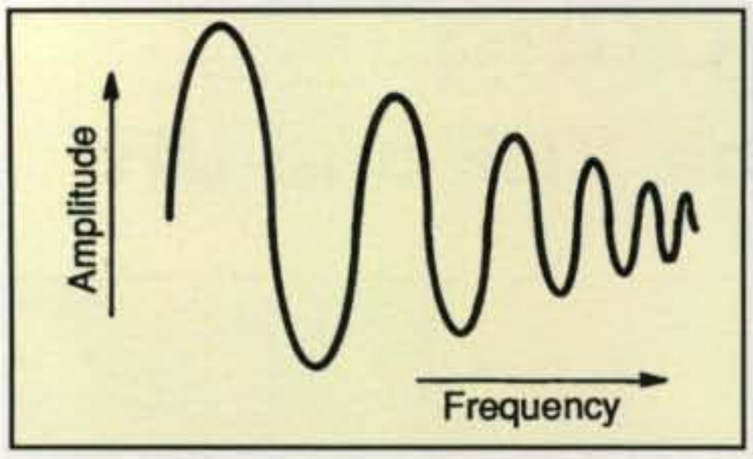

Fig. 3– Lightning produces a damped wave that varies in both frequency and amplitude. An FM receiver's circuitry limits the amplitude variations, but still responds to frequency variations.

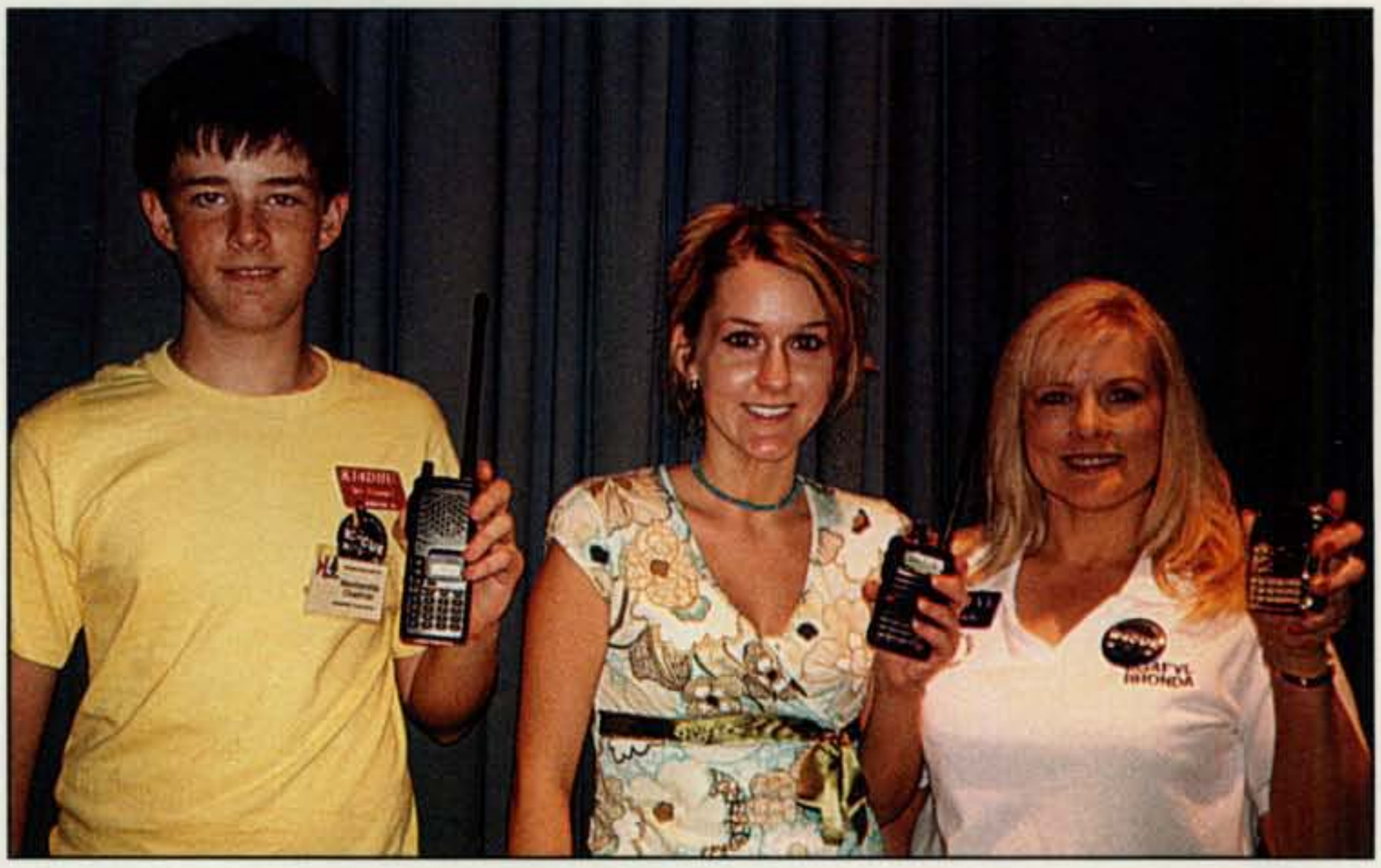

Photo B– As shown by amateur radio newcomer Will Stewart, KI4DHU (left); existing Tech licensee Crystal Glass, KG4IPZ (middle); and more experienced Extra Class licensee Rhonda Comer, KG4FVL, 2-meter FMing is a pursuit all radio amateurs can enjoy anywhere, anytime. Modern FM handhelds are great traveling companions, and they are also ideal communications aids during emergencies.

and that too is most understandable (all the frequencies—wow!). FM repeaters are carrier-activated units, which basically means any signal appearing on the repeater's input or receive frequency activates its transmitter to relay the incoming signal. A repeater obviously cannot receive and transmit simultaneously on the same frequency (or it would only hear and repeat its own signal), so widely separated receive and transmit frequencies are necessary.

As illustrated in fig. 4, a typical 2-meter FM repeater receives or inputs signals on a frequency 600 kHz (.60 MHz) below or above its transmit, or output, frequency. These nationally accepted frequency pairs and offsets, incidentally, are listed in repeater directories available from amateur radio dealers, and "automatic repeater offsetting" is also included in many modern FM transceivers.

In looking at fig. 4, some folks may ask if they could just select "direct" or "simplex" operation to both transmit and receive on a repeater channel such as 146.88 MHz, and (basically) ignore the repeater. Possibly, if the station you contact is close by and your signals are strong enough to override the repeater. However, such tactics are not considered good practice or good manners (they are akin to, or worse than, talking behind folks' backs during a conversation). Even worse is talking "direct" or "simplex" on a repeater's input frequency so everyone monitoring the repeater hears you but you do not hear them. Whew! If in doubt about frequencies, check a current repeater directory for your area and limit simplex operations to nationally coordinated allocations such as 146.52 or 146.46 MHz.

Many areas of our great land are so populated with 2-meter and 70-cm FM repeaters that stations near fringe areas of two repeaters with the same input and output frequencies can activate both "machines" when transmitting. To avoid entanglements here, each repeater may be equipped with a different CTCSS (subaudible) tone decoder so it will only respond to signals containing a similar subaudible tone. You then set your transceiver's CTCSS encoder to produce the required tone for the repeater you wish to use and join the activities.

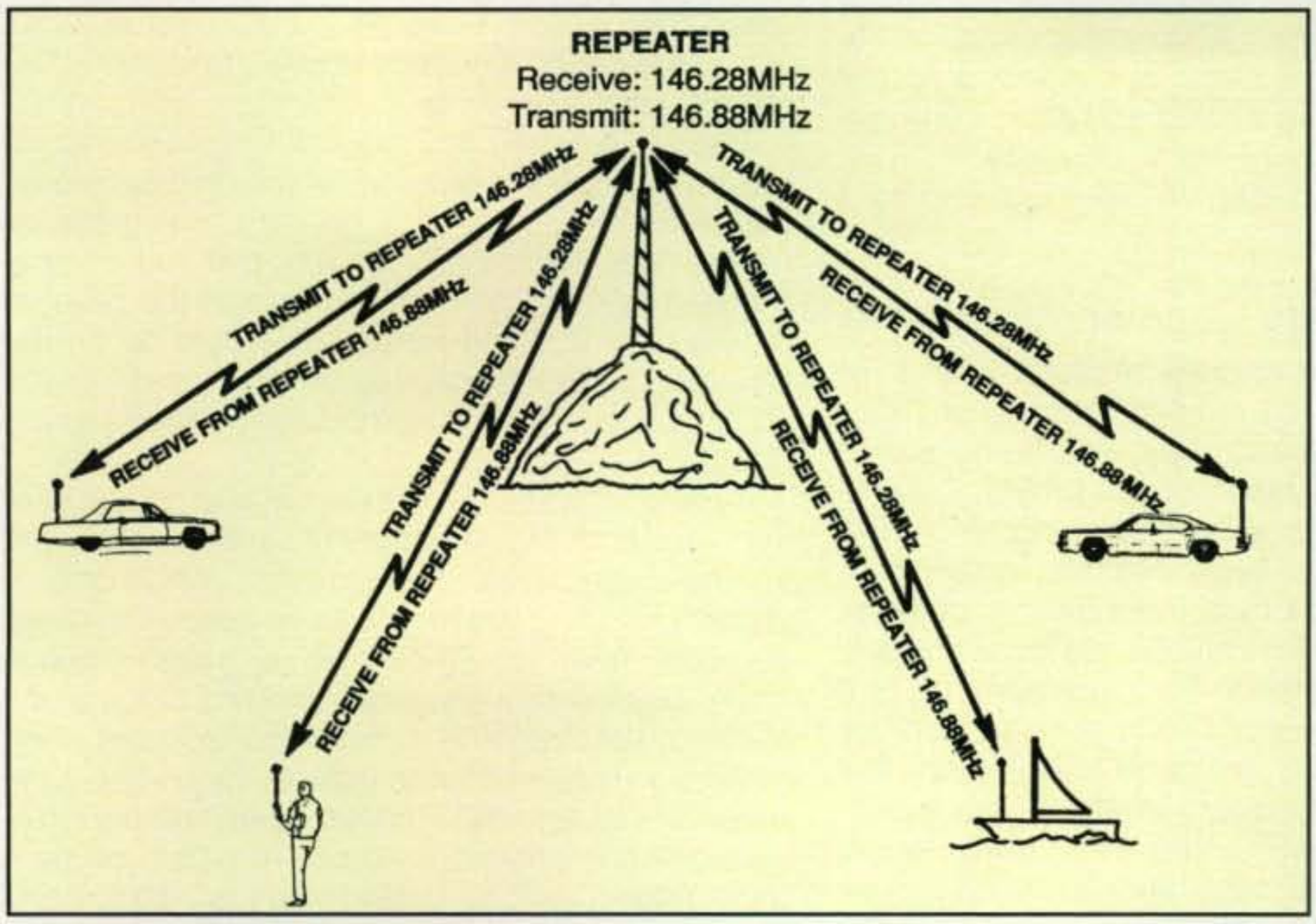

Fig. 4– Simplified example of how FM repeaters work. All stations transmit on the repeater's input frequency of 146.28 MHz and listen on the repeater's output frequency of 146.88 MHz—a 600-kHz "split." (Discussion in text.)

Conclusion

Our discussion of FM, repeaters, and toning systems could continue many more pages, but we have again filled available space and must quickly bow out for another month. Join us next time when we take a closer look at FM toning. Meanwhile, and above all, continue having fun on the air every day!

73, Dave, K4TWJ

beginner's corner

BY WAYNE YOSHIDA,* KH6WZ

Beyond "Channel Clicking"

Simplex and Other Modes on VHF and UHF

Do you take repeaters for granted? Do you feel "locked in" to a selection of memory channels on your mobile or hand-held radio (HT)? Are you afraid to put your rig into the VFO mode? Do you just not talk when people tell you your signal sounds "scratchy"?

You may want to try simplex and single sideband (SSB) or maybe even Morse Code (continuous wave, CW) on the VHF bands. It may be time to "let go" of the repeater, and try simplex and the other, more efficient communication modes: SSB and CW. Let's take a look at VHF and UHF operations "beyond channel one" on your radio.

In my earlier days as a ham, most VHF FM mobile and HT users dreamed of having more channels in their radios. Back then most rigs were crystal-controlled, and one could only "click" the main knob for frequency selection. This is why you may hear some old timers talk about rigs that were *rock-bound*. This term has two meanings. First is the literal translation, meaning that you are bound or tied (to a rock) and you have no place to go. In this case, the rock-bound ham would be limited to operating only a selection of his crystals, or the number of channels in the rig. The second meaning rock-bound is the electronic one: The radio depended on a chunk of quartz crystal, which is actually a rock, to determine frequency.

These days hams have a mind-boggling number of memory channels from which to choose. My first 2-meter rig had six channels and 5 watts of maximum power. Today, 100 or more channels and 50 watts of power are considered normal. I have always wondered what one would do with all that "space." However, just like other things in life, junk and stuff always seem to expand to fill the larger capacity. I have aircraft and other non-ham frequencies stored in my mobile radio, just because I can punch them in there. . . . and no, I do not transmit there!

FM and Repeaters – and an Alternative

Although one of the primary reasons why a repeater exists is to extend communications distance for system users, there are some cases when not using the repeater will provide clearer signals. I know this sounds surprising, since the repeater is usually a large machine with lots of power installed on a high mountaintop or a tall tower. However, if two stations are closer to one another than the distance from the repeater, or if the terrain or even weather conditions are poor for propagation, chances are good that the simplex mode will provide stronger signals. This is exactly why all current VHF and/or UHF transceivers (and many old ones, too) have a "reverse" key

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e-mail: <kh6wz@cq-amateur-radio.com>

Photo A– "Extra holes" on this boom-to-mast mount on a VHF/UHF dual-band Yagi antenna allow either vertical or horizontal polarization. Use vertical for FM communications, and horizontal for CW and SSB communications. You can make antennas more portable by replacing the hex nuts with wing nuts.

which turns the transmit and receive frequencies "upside down."

The reverse key makes it simple to check to see if you are within simplex range, as you are talking to someone on the repeater. After you have established contact via your favorite repeater and are listening to the other station, hit the reverse key on your rig. Usually, the frequency display will show what just happened: The transmit and receive frequencies have reversed. That is, what was the receive frequency is now the transmit frequency, and vice-versa.

Therefore, when you are listening to someone talking through the repeater in the reverse mode, you are really listening to the transmitting station on the repeater "input" frequency. If you were to transmit to the other station while in the reverse mode, your transmit frequency would be on the repeater "output" frequency, which means that the other guy would be listening to you without going through the repeater.

If you can hear him "on reverse" and he can year you, then both of you are within simplex range and you no longer need to use the repeater (in fact, it is poor operating practice to tie up a repeater when you don't need to). Once both (or more) stations have verified that they can indeed talk to one another without going through the repeater, then go back to "normal" mode (usually by pressing the reverse key again). Find an open simplex frequency and continue your conversation on simplex. Take a look at Table I and the ARRL band plans for the 144, 222, and 440 MHz bands (on the ARRL website, see References). Some areas have different band plans, so check with your local experts on the radio, or check the local frequen-

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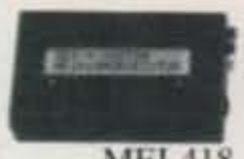

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144 MHz (2 m)	146.40–146.58, 147.42–147.57	146.520
222 MHz (1.35 m)	223.40–223.52	223.50
440 MHz (70 cm)	445–447	446.00

Table I– Commonly used FM simplex frequencies (per ARRL band plans; check for local variations).

cy coordinators for advice. An easier way to double-check proper frequencies to use is to check with your fellow radio club members, since most clubs have a list of favorite simplex frequencies to use. Find out what they are and program them into your radio.

The DX Modes: SSB and CW

If you really want to try something new on the VHF and UHF bands, try some of the more efficient radio modes, such as SSB and CW. FM is fine, and the transmitted fidelity of most rigs on FM is pretty amazing, but to get more distance (DX) you need to change the mode to SSB or CW. This requires one of the "multi-mode" radios. Current models include the ICOM IC-706 and 746, Kenwood TS-2000, and Yaesu FT-817 or FT-897. Older classic VHF/UHF multi-mode radios include the ICOM IC-202, Kenwood TS-711 (2 meters) and TS-811 (70 cm), and the Yaesu FT-736, among many others. Take a look at the ads in this issue, or go visit your favorite radio store for details on these rigs.

The Antenna

This is a good time to mention the importance of an effective antenna. There is an old ham radio saying that goes, "If you can't hear 'em, you can't work 'em," which makes a lot of sense. You have to hear the other stations to talk to them. This means that more effective antenna systems (so you can hear better) increase your chances of success.

On the VHF and above bands antenna polarization, or the way in which the antenna is oriented in relation to the ground (either horizontal or vertical), is important. There is a third orientation called "circular," which is usually used with satellite communications, another "multi-mode" VHF and up mode. Yes, there is a "right hand" circular and a "left hand" circular polarization. These antenna types are complex and specialized and are useful (sometimes mandatory) for satellite work, but for normal "terrestrial" operations, circular polarization will not be needed.

By tradition (and I am sure there is a technical reason for this, but we won't go into that here), SSB and CW VHF and up operations are done with horizontal antennas, and FM operations use vertical antennas. How do you make a horizontal antenna? It's very simple: Just twist the main boom so that the elements are polarized the way you want. For example, the Cushcraft dual-band (2m/70cm) Yagi (beam) antenna I use for portable operations can be mounted either horizontally or vertically, since the main boom is factory-drilled to mount either way. Photo A shows a close-up of the boom-to-mast U-bolt mount.

Photo B– This little loop for 2 meters works surprisingly well. During a recent VHF contest I managed to work an XE2 (Mexico) station several hundred miles away.

Band	CW Freqs. (MHz)	SSB Freqs. (MHz)	Calling Freq. (MHz)
50 MHz (6 m)	50.0–50.1	50.1–50.3	50.125, 50.200
144 MHz (2 m)	144.0–144.1	144.150–144.275	144.200
222 MHz (1.35 m)	222.0–222.15	222.0–222.15	222.100
430 MHz (70 cm)	432.07–432.10	432.10–432.30	432.100

Table II– Commonly used CW/SSB frequencies. Monitor calling frequencies for activity, establish contact there, and then QSY.

Here's a hint when building an antenna like this: If you are considering using the antenna for portable operations, replace the hex nuts with stainless-steel wing nuts so you can tighten and remove them by hand. Keep a sack of spare nuts in your bag or tool kit, since you usually will lose one or two on the road.

By the way, a great series of articles on "Cheap Yagis" by Kent Britain, WA5VJB, began in the July 2004 issue of *CQ* on page 70. Kent describes great-performing antennas using easy-to-obtain parts.

Okay, so now you have improved your antenna system beyond a rubber-duckie or a little magnet-mount antenna. You can talk to your best friends and fellow club members on both simplex and repeater mode. You now notice that there are also other stations out there enjoying quieter frequencies, away from the hustle and bustle of a busy repeater system. SSB and CW operators tend to use frequencies at the low end of the VHF ham bands (see Table II).

Now it's time to try one of my favorite operating events. . . .

Contesting!

Usually contesters are a quiet (and not-so-quiet), competitive bunch of guys (and gals). It takes a lot of very efficient operating skill to "run" stations, contacting as many stations as possible in a specific and short amount of time, usually 24–48 hours. Contesting is a great way to improve and hone your skill in operating your radio and antennas for maximum performance. It also requires endurance and concentration to compete for the duration of the event.

Watch John Dorr, K1AR's "Contesting" column and Joe Lynch, N6CL's "VHF-Plus" column in this magazine for information on upcoming VHF and UHF contests. There are a few contests for VHF and above operators, including the ARRL January VHF Sweepstakes, ARRL June VHF QSO Party, and of course, the CQ World-Wide VHF Contest (July).

The Exchange. In any ham radio contest, the QSO is an "exchange" of special information. In the case of a VHF contest, you exchange information on your location, usually a grid square. (The ARRL website, <www.arrl.org>, has information on grid squares, including a grid square locator.) Typical contest QSOs might sound like this:

Me: "CQ contest, CQ contest, this is Kilo Hotel Six Whiskey Zulu."

Steve: "KH6WZ, this is W6GOS."

Me: "W6GOS, Delta Mike thirteen."

Steve: "Roger, DM13 also from W6GOS."

Me: "Thanks. CQ contest CQ contest, this is KH6WZ."

Mike: "KH6WZ from November India seven Tango."

Me: "NI7T, Delta Mike thirteen."

Mike: "QSL. Delta November one-four. NI7T."

Me: "Thanks. CQ contest CQ contest, this is KH6WZ. . . ."

And the process repeats.

The "DM13" is the grid square for Huntington Beach. NI7T is located in DN14, in Oregon. Think of the grid square as a precise locator used for describing where in the world you are.

Eye Openers

I am always amazed at what an effective antenna system can do at VHF and above frequencies. I recently acquired a 2-meter loop antenna from a friend for a really great price (see photo B). It is about three feet above the car's roof. I managed to work stations several hundreds of miles away using this setup and 5 watts of power on SSB. Every VHF and above operator has similar success stories to tell.

If you recently tried VHF/UHF contesting for the first time, tell me about it, and I may include some of your stories—and photos—in a future column!

73, Wayne, KH6WZ

References

A nice frequency chart is available from the ARRL:
<http://www.arrl.org/FandES/field/regulations/Hambands_bw.pdf>
ARRL Band Plans: <http://www.arrl.org/FandES/field/regulations/bandplan.html>
ARRL Contest Calendar: <http://www.arrl.org/contests/calendar.html>
ARRL Grid Square Locator: <http://www.arrl.org/locate/gridinfo.html>
" 'Cheap Yagis' for 2 Meters," by Kent Britain, WA5VJB, *CQ*, July 2004, page 70.
CQ World-Wide VHF Contest rules: <http://www.cq-amateur-radio.com/VHF%20Contest%20Rules%20200432104.pdf>
Southern California Repeater and Remote Base Association (SCRRBA): <http://www.scrrba.org>

antennas

BY KENT BRITAIN,* WA5VJB

More "Cheap Yagis"

These 450-MHz "Cheap Yagis" were the first ones published 11 years ago, but I've made a few tweaks along the way since then. They have proven great for portable operation, backpacking, and transmitter hunts, and are something inexpensive you can throw up in the attic for that weak repeater.

Theory

You don't see any gamma matches, shorting bars, trimmer caps, or any other adjustments on the driven element. We are using the structure of the Yagi itself for impedance matching.

It's a simple technique. A dipole has roughly 72 ohms impedance when it's in free space. As other elements, or even the ground, approach the dipole, its impedance is lowered. Put the other elements at just the right distance and you can get a direct match to 50 ohms. This works and is simple enough, but you can't get the elements close enough to couple much of the power into the Yagi structure.

You can also use a folded dipole as the driven element with its 300-ohm impedance in free space. Many antenna companies, such as Tonna (the F9FT), have used this technique. I've had one of Tonna's 21-element 432-MHz beams in the air for 25 years. However, that first director must be mounted very, very close to the driven element to pull it down to 50 ohms. That's okay for a machine shop, but the tolerances are very tight for a hand drill and a piece of wood.

As a result, I ended up with the folded-J driven element. This driven element has an approximately 150-ohm impedance in free space. With 150 ohms, the elements are spaced about right for a good-performing Yagi matched to 50-ohm coax (fig. 1). Later we can spread out the elements a bit and make 75-ohm ATV versions.

Now for our construction project.

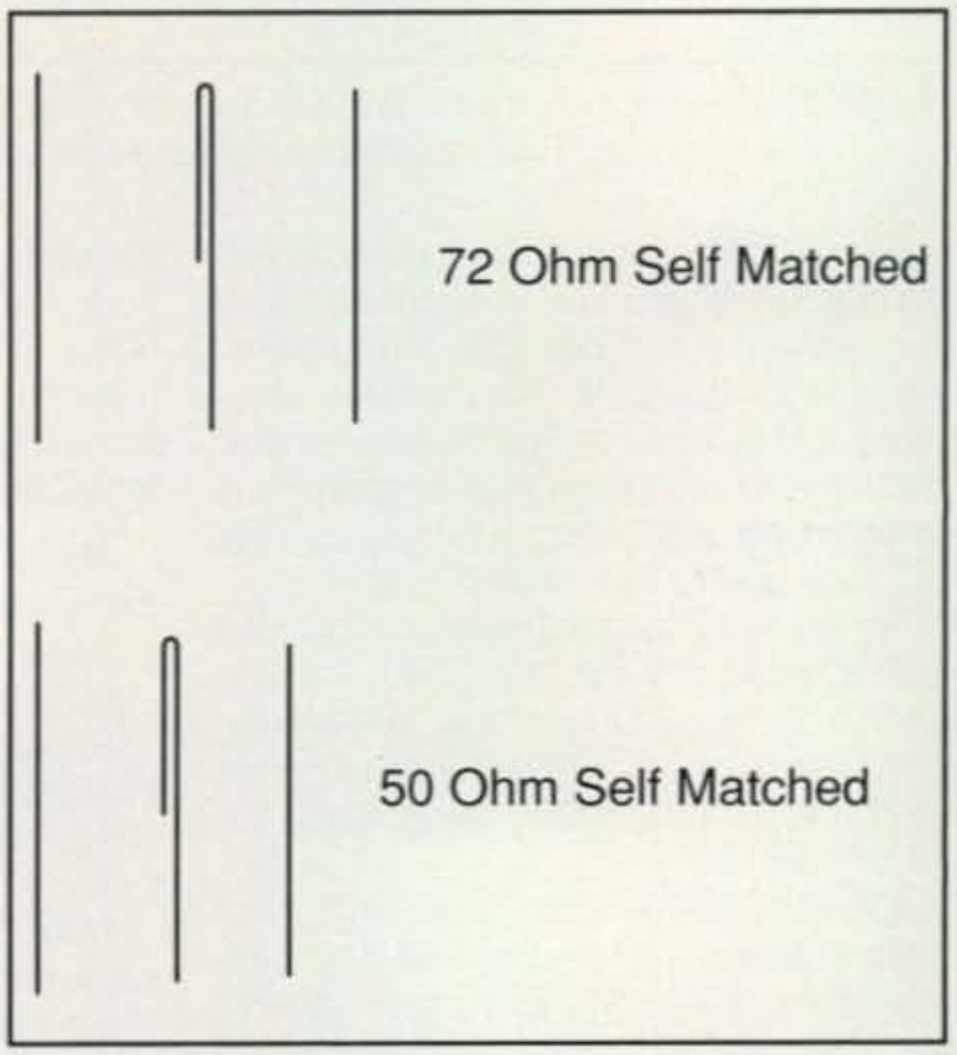

Fig. 1– 50-ohm and 75-ohm spacing.

Photo A– Driven element and coax.

Construction

Fig. 2 is the driven element, which is used in all four versions of the Cheap Yagi (3-, 4-, 6-, and 8-elements; see Table I, II, and III). If you want to tweak the SWR, then trim the free end of the J. If you trim off too much, you can solder back on almost any short piece of wire, although a short piece of 1/8-inch hobby brass tubing works best for me. Although harder to work with, 1/8-inch silicon bronze welding rod makes the strongest driven element, and it's still easy to solder.

The boom is made from wood. I like to use 1/2" × 3/4" for most projects, but 3/4-inch square or anything up to 1-inch square can be used. You really don't want to use a 2 × 4. There would be enough mass in the wood to detune the element. I learned this the hard way with a 1270-MHz version. For portable and temporary operation, almost any wood can be used. For longer life outside, fir, oak, or another hardwood works best, but I personally think it's overkill. A quick coat of spar varnish, wood sealer, or even house paint will greatly extend the life of the antenna.

One of my very first Cheap Yagis was a 900-MHz version that lasted about five years up on the tower. At about the same time, I built an array of 421-MHz Cheap Yagis for the local ATV repeater. These were mounted in the attic, and except for a coat of dust, they still look fine after 12 years. I know several have been built with plastic water

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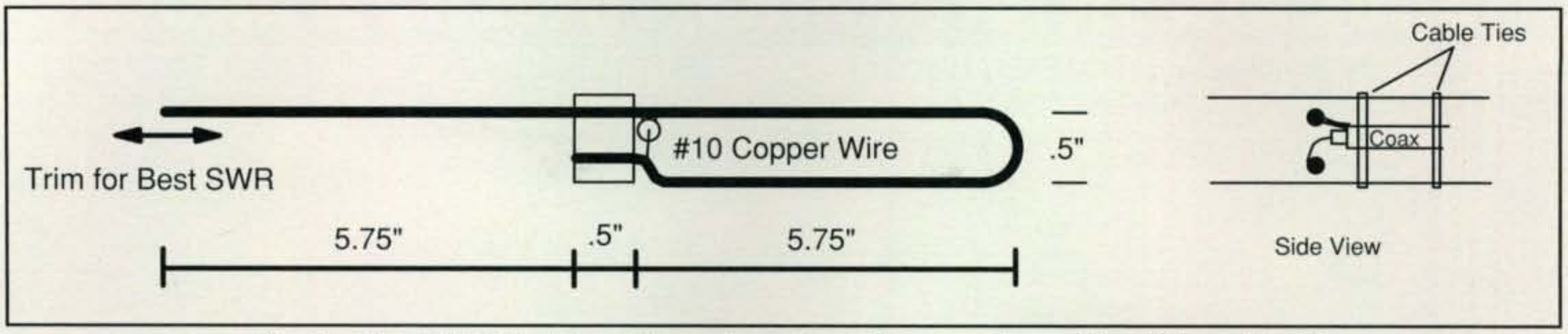

Fig. 2– The 445-MHz driven element used on all four versions of the "Cheap Yagi."

3-element Cheap Yagi*

	Length	Spacing	Diameter
Reflector	13.1	0	.125
Driven element	Fig. 2	2.6	—
Director	11.25	7.75	.125

**All dimensions are in inches.*

Table I– The 3-element Cheap Yagi. Gain is about 7.5 dBi with a front-to-back ratio of about 25 dB. If you want to use .25" (1/4") rod for the director and reflector, shorten the director from 11.25" to 11.0". Yes, we are changing only the director, even though a thicker rod is used for the director and the reflector.

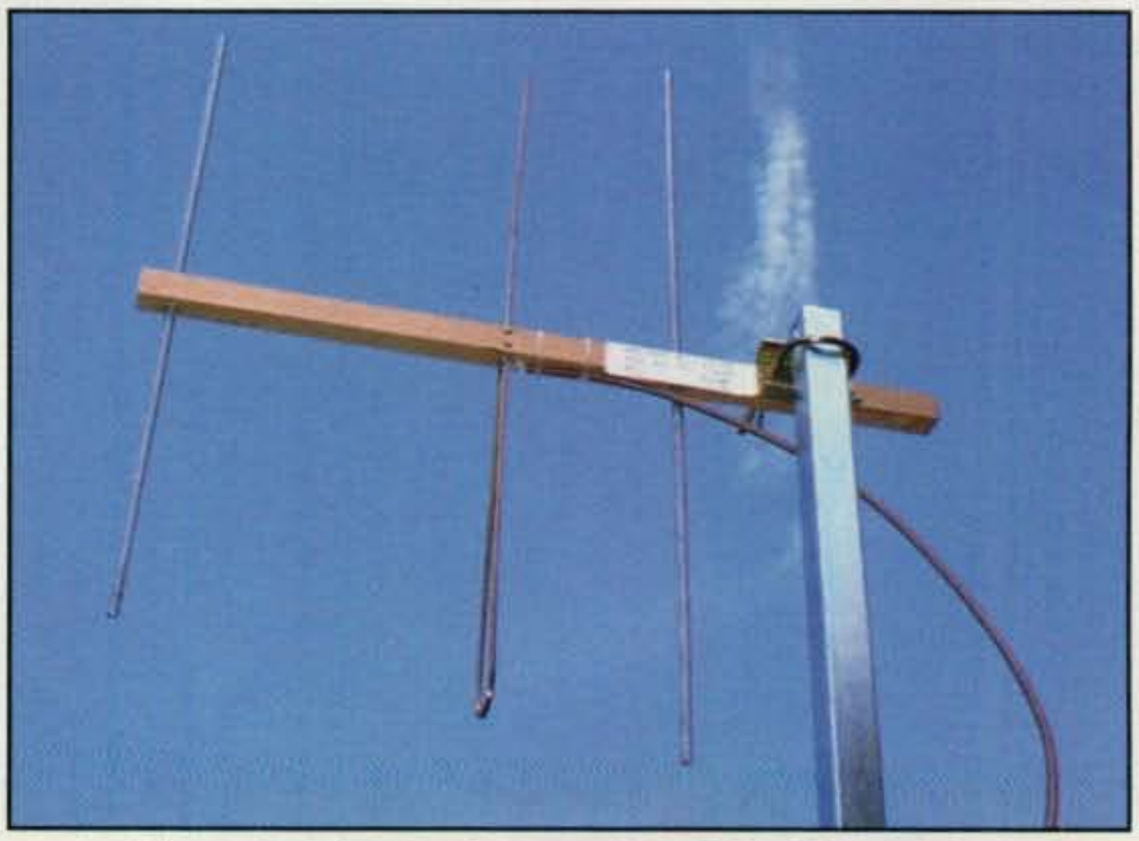

Photo B– The 3-element 445-MHz Cheap Yagi.

4-element Cheap Yagi*

	Length	Spacing	Diameter
Reflector	13.23	0	.125
Driven element	Fig. 3	2.75	—
Director 1 (D1)	12.0	6.0	.125
Director 2 (D2)	10.3	13.25	.125

**All dimensions are in inches.*

Table II– The 4-element Cheap Yagi. Gain is now about 8.5 dBi with the front-to-back ratio running between 25 and 35 dB. The antenna is usable from 430 to 450 MHz, although the pattern gets kind of rough below 435 MHz. Again, if you want to use .25" (1/4") rod for the directors and reflectors, shorten D1 from 10.0" to 11.75" and D2 from 10.3" to 10.0". The director length is not changed.

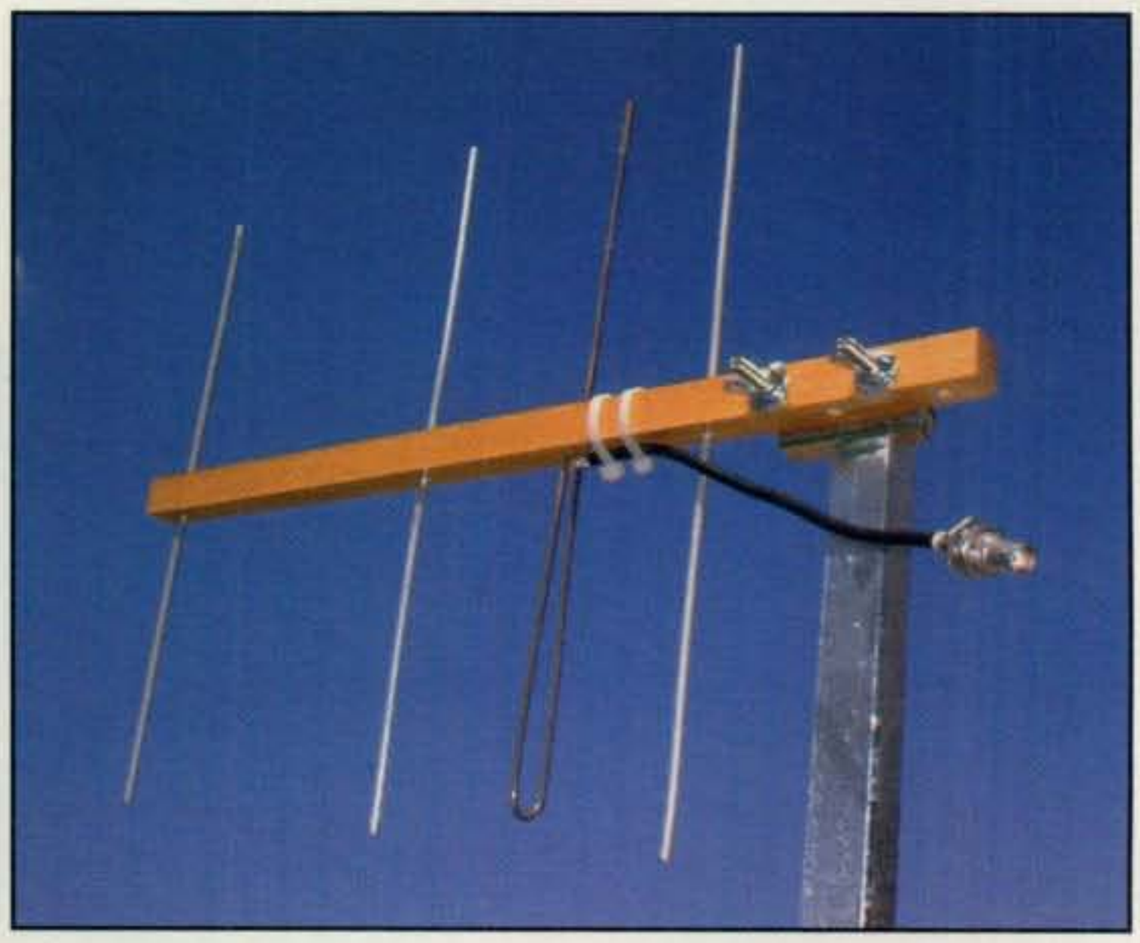

Photo C– The 4-element 445-MHz Cheap Yagi.

pipe. The only time I tried it, the plastic melted when I tried to solder on the coax, but plastic water pipe will work.

The elements can be made from #10 copper wire, silicon bronze welding rod, brass or copper 1/8-inch hobby tubing, or aluminum rod. However, by far the cheapest stuff to use is RadioShack 1/8-inch aluminum ground wire (catalog part #15-035). About $5.00 worth of this stuff is enough to build about ten of these antennas.

If you're using 1/8-inch diameter elements, just use a 1/8-inch drill bit to drill the mounting holes in the boom. This will give a good, snug fit. A dab of glue will hold the elements in. Super Glue® works well, RTV has been used, or my personal favorite is Liquid Nails®.

I have always soldered the coax to the driven element. The shield is soldered pretty close to the middle of the J element. The coax center conductor goes near the tip of the J driven element. I know some have built the antenna with an aluminum driven element and devised small clamps to hold on the coax. Long term, I think soldering is much more reliable than mechanical clips.

It was noted last time that I hadn't used UV-resistant cable ties to hold the coax to the boom. There is a lot of personal preference involved here. I've used cable ties, electrical tape, duct tape, solid-core wire, and garbage-bag ties to tie the coax to the boom. If you plan to mount these antennas out-

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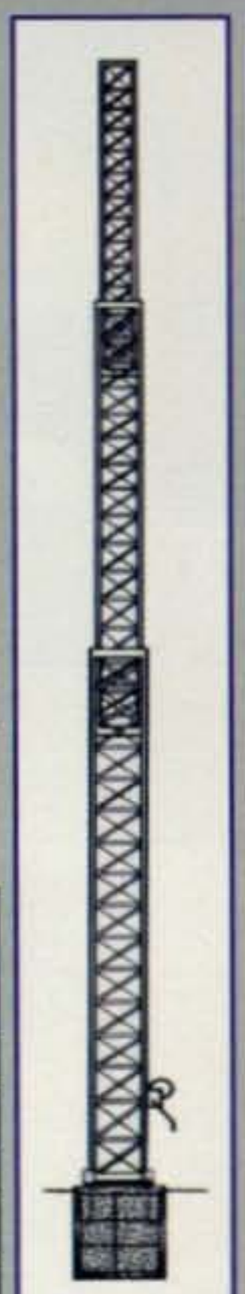

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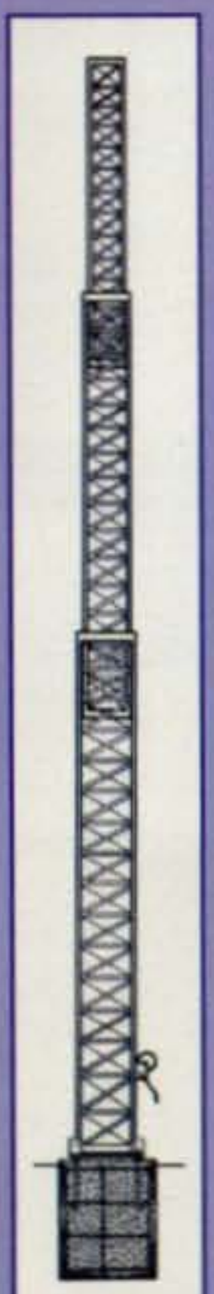

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HDX-572MDPL	72'	22'8"	1600	$8,281	$6,999
HDX-589MDPL	89'	23'8"	2440	$10,841	$9,179
HDX-689MDPL	89'	23'8"	3450	$20,943	$17,699
HDX-5106MDPL	106'	24'8"	3700	$22,791	$19,299

MA SERIES CRANK-UP MASTS

• Handles up to 22 square feet of antenna load. (See chart below)

• MDP models include motor drive.

• All models supllied with anchor bolts, load-actuated hand winch, and house bracket.

• Options include coax arms, raising fixtures, motor drives, self-supporting and rotator bases, remote control panel, and more!

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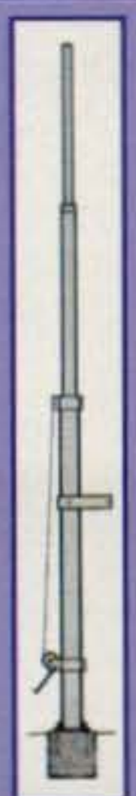

MA SERIES CRANK-UP MASTS							
MAST MODEL	MAX. HT.	MIN. HT.	WT. (LBS.)	50 MPH (sq. ft.)	70 MPH (sq. ft.)	LIST PRICE	SALE PRICE
MA-40	40'	21'6"	242	16.5	6.8	$1,209	$1,039
MA-550	55'	22'1"	435	22	9	$1,875	$1,599
MA-550MDP	55'	22'1"	620	22	9	$3,584	$2,999
MA-770	71'	22'10"	645	15.5	5.5	$3,091	$2,619
MA-770MDP	71'	22'10"	830	15.5	5.5	$4,890	$4,129
MA-850MDP	85'	23'6"	1128	15.3	6.3	$6,591	$5,549

TMM SERIES COMPACT CRANK-UP TOWERS

• Handles 20 square feet of antenna load at 50 MPH, 8 square feet at 70 MPH.

• Compact design is great for areas with tower restrictions, or where a less intrusive installation is desirable.

• All models supllied with hinged T-base, anchor bolts, load-actuated hand winch, 8' steel mast, top plate, and rotor plate.

• Options include coax arms, raising fixtures, motor drives, thrust bearing, remote control panel, and more!

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TMM SERIES COMPACT CRANK-UP TOWERS					
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TMM-433HD	33'	11'4"	400	$1,970	$1,669
TMM-541SS	41'	12'	430	$2,135	$1,799

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Photo D– The six-element version of the Cheap Yagi.

Photo E– Mounting holes.

side, I recommend sealing the coax braid to keep water from wicking back down the coax. Varnish, RTV, and Liquid Nails® all have been used with good results.

Mounting

While I have held these antennas up with duct tape and rope, a U-bolt is more practical. Spending a little more money and getting the wing nuts for the U-bolt is well worth it for when you're out portable. I also like to drill the boom to accept the U-bolt both ways so I can run it vertically or horizontally attached to almost any mast. Offset the holes a bit so you won't weaken the boom.

6-element Cheap Yagi*

	Reflector	DE	D1	D2	D3	D4	D5	D6
Length	13.0	Fig. 2	12.0	11.75	11.73	10.75	—	—
Position	0	2.5	5.5	11.0	18.0	23.5	—	—

8-element Cheap Yagi*

	Reflector	DE	D1	D2	D3	D4	D5	D6
Length	13.0	Fig. 2	12.0	11.5	11.5	11.5	11.5	10.5
Position	0	2.5	5.5	11.0	18.0	23.5	29.5	35.5

**All dimensions are in inches. All elements are 1/8" diameter.*

Table III– The 6- and 8-element versions. Gain for the 6-element version will be about 11 dBi with a pretty good 30-dB front-to-back ratio. With the 8-element Cheap Yagi, gain is near 12.5 dBi, with again a 30-dB front-to-back ratio. I could squeeze another 1/2 dB or so out of these designs, but the dimensions start getting very tight. Gain on a tight Yagi would disintegrate very quickly with a few bent elements, but an ugly Cheap Yagi just keeps on working.

On the Air

Just hook up the antenna to your radio and start talking. Built to the dimensions given, the SWR should be well under 2 to 1, and it usually will be better than 1.5 to 1. As I mentioned earlier, however, you can tweak the free end of the J for best SWR.

Wes, W7ZOI, likes to take these antennas backpacking. He takes advantage of the soft aluminum elements and just folds the antenna elements flush with the boom and packs them away. Later on a hilltop he just straightens out the elements. He says they are good for about a half-dozen expeditions, and then he just builds a new one.

I like to build each antenna before I publish the design, and not all of them work. I then started wondering, and just stood out in my garage and started counting antennas. I counted 119! The frightening part is that I know that was only the top layer! Oh well . . . I have at least another 37 in the air. Have fun experimenting and get some antennas up in the air!

Now what shall we cover next time? 222 MHz? ATV? AMSAT? Drop me an e-mail at <wa5vjb@cq-amateur-radio.com> and let me know.

73, Kent, WA5VJB

PS: For those of you who remember my column in the July issue, yes, I do know the difference between impedance and power. I'm afraid we were the victims of a glitch in the translation from one computer software version to another and the ohm symbol did not come through. From now on I'll be spelling out "ohm"! I also must say that the best comment was from the QRPer who didn't like to use 50-watt coax and wanted to know the best source for 1-watt coax.

The **Par Omniangle** antennas accomplish what the halo and turnstile started out to do - provide a clean omnidirectional, horizontally polarized antenna. These antennas lend themselves to SSB/CW mobile, fixed station where a rotator is not convenient, net control, and even working the Russian satellites. Their small, light weight size also makes the Omniangles ideal for use where antenna restrictions are in effect. Visit the Universal website for additional details and illustrations plus information on the new **Par SM-50** stressed Moxon 6 meter antenna.

Model	MHz	1.5:1 BW	Order#	Price
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BY DAVE INGRAM,* K4TWJ

More "Try HF" Notes for Newcomers

Your response to our January 2004 column's encouragement to try HF-band operations was most favorable, and your requests for more "getting started" notes and tips cannot be overlooked. Thus, we are continuing along that path this month, and we trust it will prove helpful in expanding your radio horizons.

As we discussed earlier, our HF bands are the real backbone of amateur radio, the glitz and glam-our areas you really should experience first hand to appreciate them. We also sense more license restructuring will soon grant all radio amateurs some HF privileges, and we encourage you to enjoy those benefits while sounding like an old pro right from the start. That requires some assistance. Younger amateurs reading this column are also urged to remember this guide and pass on similar horizon-expanding encouragement to the next generation, with similar "pass it on" encouragement. Through our combined efforts, we can ensure amateur radio's proud legacies and traditions will continue throughout the annals of time—an important endeavor in which everyone plays a noteworthy part.

Last time, as you may recall, we discussed HF'n in rather general and introductory terms. This time let's focus on some specifics to give you a good head start in the game.

Successful HF'n depends on a combination of three interrelated factors: your transceiver, your antenna system, and your on-the-air operating expertise. Until recently, newer amateurs really needed all three factors in their favor for good HF results. Today, however, the bands are less crowded and there are fewer high-power super-stations on the air on a regular basis. As a result, you can have a ball and work all over the world without owning the biggest and the best in gear and antennas (I am living proof of that fact, as my setups are simple and I have a ball!). Furthermore, the more time you spend enjoying HF, the more your operating expertise will improve. Now let's take a closer look at each of the previously mentioned factors.

*4941 Scenic View Drive, Birmingham, AL 35210
e-mail: <k4twj@cq-amateur-radio.com>

Photo A– Every radio amateur dreams of owning a lavish top-of-the-line transceiver, but most of us settle for a smaller and more affordably priced rig. The good news is you can work the same stations with a smaller transceiver (most of the time) and have just as much fun—well, almost! (Photo courtesy of ICOM America, Inc.)

Transceiver Talk

The main features and functions to look for when choosing an HF transceiver are size, cost, and operating frills. Since you can work the same stations with a big or small transceiver, a mid-size (and mid-priced) rig with fewer special features and functions

Photo B– Used transceivers found at hamfest flea markets may bear an attractive price tag, but they also may have been used and abused well beyond normal limits. Choosing carefully and test-tuning before purchase is heartily encouraged.

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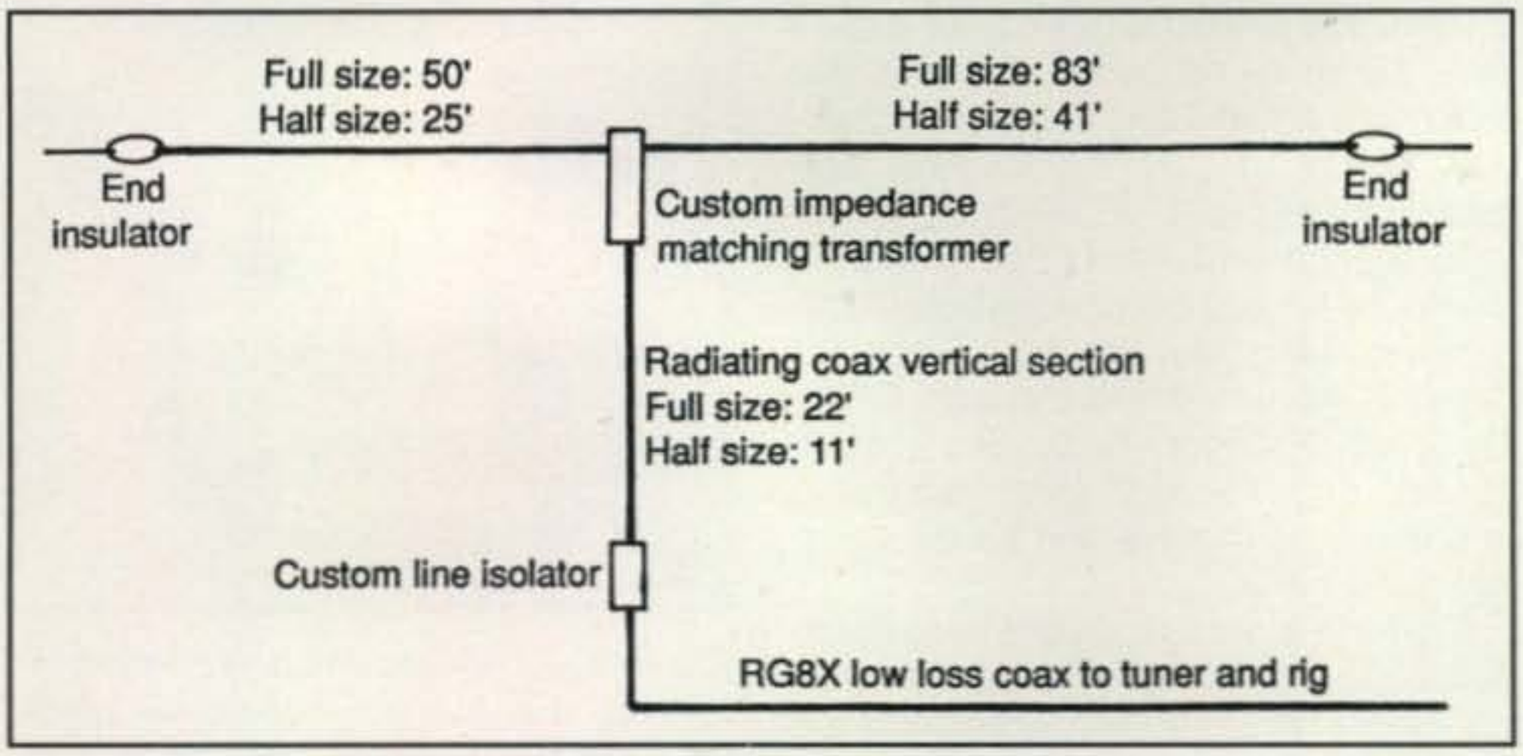

Fig. 1– General layout of the popular Carolina Windom antenna. Half-size and barely visible "low profile" versions are also available from The Radio Works (see text).

may be the top choice. It will hold good resale value without maxing out your budget, plus allow you to add some extra frills such as a custom microphone, key, and pocket-size rig to your setup. Nice! Opting for used gear may be an acceptable choice if you can be assured it was not subjected to excess heat, cold, dampness, or dirt. A clean, undamaged case may hint at good "innards," but test-tuning before buying is usually beneficial. Perplexed by features, functions, and related technical descriptions associated with modern transceivers? Relax. Some brief explanations of those aspects follow.

Receive Sensitivity describes how well a transceiver can copy a weak signal. A sensitivity of 0.16 microvolt (μV) for SSB or CW reception in the main HF range of 1.8 to 30 MHz is typical.

Noise Floor describes the background or internal noise a transceiver produces during operation, and figures in the –125 dB to –135 dB range are normal. Receivers with higher background noise levels exhibit figures such as –115 dB (which means the noise is not as far down), while "quieter" receivers exhibit lower noise figures such as –140 dB or greater.

Dynamic Range describes the range of signal levels a transceiver can copy before weak signals drop into the noise floor or strong signals overload the receiver's "front end" (RF) circuitry and cause distortion, "buckshotting noise," and AGC pumping. A dynamic range of 100 to 105 dB is typical for most modern mid- and full-size transceivers. As a means of visualizing effects here, ICOM's new top-of-the-line IC-7800 transceiver is "speced" at 110 dB dynamic range. Reflecting back on dB discussions in past columns, every 3 dB gain or loss is equivalent to doubling or halving a previous value/level, and human ears can detect changes of 3 dB. Without even tuning an IC-7800, we can thus sense its 5-dB improvement will produce a quite noticeable difference in reception.

Speech Compressor relates to a circuit/feature that enhances your SSB signal with slightly more "talk power" and punch. It is quite beneficial for DXing and/or communicating under adverse band conditions. The key to

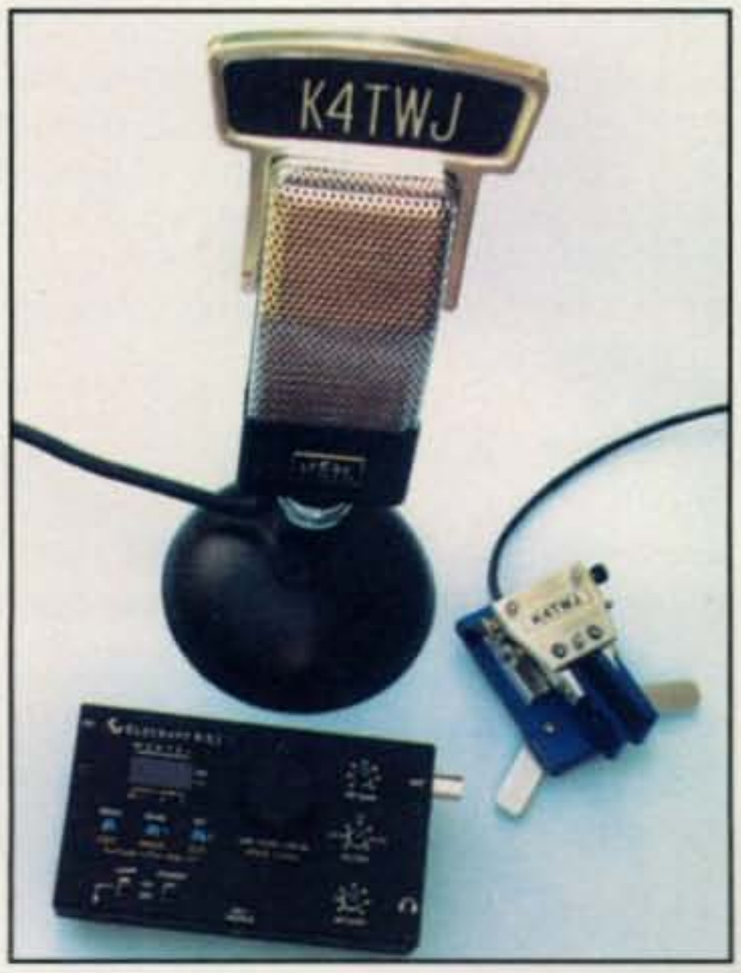

Photo C– Including in your HF plans special extras such as a custom microphone, key, and/or portable transceiver for traveling adds extra enjoyment to an already terrific pursuit. Items shown here are a Heil Sound Classic mic, custom Parkwood paddle from WB9LPU, and battery-powered KX-1 CW transceiver kit from Elecraft.

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proper speech-compressor use is setting the level low to avoid distortion and adjacent frequency "splatter," yet still acquiring good, high tonal response for maximum signal readability.

Electronic Keyer and Full Break-in Operation make CW operations extra enjoyable. (You are planning to try CW, aren't you? It is the proven best and most effective way to reach out and work DX with low power and a simple antenna—from anywhere.) When using an electronic keyer, you simply tap a CW paddle's dot and dash fingerpieces and it sends perfectly formed code characters. Even folks with fumblesome fingers can sound like a CW pro when using a keyer. Full break-in operation, or "QSK," lets you hear/receive in between your transmitted dots and dashes so you can stay abreast of what is happening on-frequency. You then can accurately time your calls, observe the "competition," and improve your DXing success tenfold.

Receiver Selectivity describes how well a transceiver can receive a weak on-frequency signal (its –6 dB bandwidth) while rejecting a stronger off-frequency signal (its –60 dB bandwidth). A –6 dB width of 2.4 kHz for SSB and a –60 dB width of 4.5 to 6.0 kHz is typical. The wider the –6 dB width (2.6 or 3.0 kHz rather than 2.4 kHz, for example), the more rich and full-bodied the receiver's audio—and the more vulnerable reception is to interference. The more narrow the –6 dB width (2.1 or 1.8 kHz rather than 2.4 kHz, for example), the more limited or "concentrated" the receive audio, but the better it is for copying weak signals through QRM. Optional IF filters, passband adjustments, and transmit DSP may also improve both receive and transmit signal bandwidths.

IF Shift moves a receiver's fixed bandwidth up or down slightly in frequency so an interfering signal falls outside of the IF filter bandwidth and is reduced in signal strength (it reduces QRM).

PassBand Tuning (PBT) also moves a receiver's bandwidth up or down slightly in frequency. When this control is adjusted either side of its center/resting frequency, it also narrows the bandwidth so an interfering signal falls outside of the passband. As a result, it is usually more effective in reducing QRM.

Digital Signal Processing (DSP) is often used to automatically reduce band noise (that constant background noise that is not removed by a noise blanker) and automatically "notch out" interfering tune-up tones called *heterodynes*.

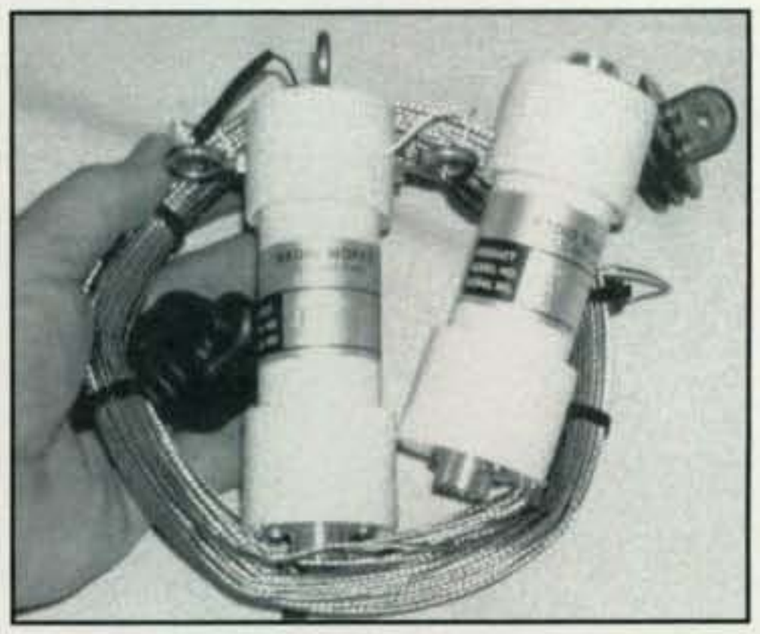

Photo D– Looking for a high-performance, yet barely noticeable wire antenna for multiband operation with your rig's tuner? Check out the new LP (Low Profile) version of Carolina Windom available from The Radio Works. It uses small-gauge wire and small, custom-designed line transformers and works out like a champ. It also hides easily among a small stand of trees. (Details in text.)

It operates by sampling and performing mathematical computations on incoming data (signals) and works fairly well at the audio level (AF DSP), but noticeably better at the IF level (IF DSP).

IF DSP may also support both receive and transmit passband filtering and shaping functions, which are accomplished by converting signals to data and then "clocking" the data through a mathematical processor to yield superb selectivity. This discussion obviously could continue for many more pages (and it does in my book *Your Guide to HF Fun*, $16 plus $2.50 postage/$3.85 Priority Mail direct from K4TWJ to you), but column space is limited. Moving right along . . .

Antenna Tips

Whether your selected transceiver is simple or elaborate, strive to mate it with the best possible antenna for your par-

Photo E– Need coax? Check out The Radio Works special deal on low-loss RG8X in 1.5-, 3-, 6-, 9-, 21-, and 100-foot lengths, complete with pre-installed PL-259 plugs. You can't miss!

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ticular budget and location. Your first days on HF are the most important and lead to your initial impression of the bands. This is when you need the most positive results, and a good antenna delivers the goods, so to speak. Please, please avoid unnecessarily cutting corners by using a random length of stray wire or your dwelling's metal rain gutter as an antenna.

If space is at a premium and you are limited to installing only one wire antenna, consider a high-performance version of the Carolina Windom available from The Radio Works (Box 6159, Portsmouth, VA 23703; telephone 1-800-280-8327, or <www.radioworks.com>). The original Carolina Windom was terrific, and like many users, I found it significantly outperformed a multiband doublet or G5RV. The Radio Works' new optimized versions with custom-wound impedance-matching transformers and line isolators, however, work even better. If visibility is a consideration, get the "LP" (low profile) version. Once installed, you can look straight at it and not realize it's there. My first contact a few years ago when using a Carolina Windom and only 50 watts was a BY in China. My first contact with a new "LP" Carolina Windom this year was a DU in the Philippines, followed by a ZA in Albania, and still while running only 50 watts. You could not ask for a better recommendation than that, Just don't waste time trying to homebrew a copy with baluns; get the "real thing" from The Radio Works. Check out the company's special deal on low-loss RG8X coax, too; Radio Works will even install PL-259 connectors on it for you.

Operating Hints

If I were to offer just a single suggestion to newer amateurs, it would be to continuously strive to perfect your operating skills and on-the-air image. How? Remember other amateurs only hear your voice, and first impressions are always the longest lasting. Do not feel shy or intimidated simply because the whole world can hear you (what a blast!). Just maintain an air of courtesy and enjoy the ride. If your transceiver has transmit audio equalization, use it (and a custom mic, if funds permit) to enhance your voice. Add only enough speech compression to produce a slight treble boost and add presence.

Develop the ability to concentrate on a single signal amidst a crowd of screaming eagles in a contest or pile-up (listening to your significant other while the TV screams with car commercials is good practice here). Notice how sharp operators are in and out of a pile-up while others continue calling in vain, and how some DX stations are overrun by continuous callers when they cannot control a pile-up.

Practice and operate CW, too. It is the ideal way to contact "rare" countries. Just recently, for example, I contacted JT1CQ while running only 50 watts on 20 meters. JT1CQ, incidentally, is in Mongolia and Zone 23, the last zone everyone needs for WAZ. After my QSO, he called CQ—with no U.S. callers. A word to the wise should suffice.

Finally, realize even the best operators with the best gear are not *always* successful and enjoy every HF operating experience regardless of its returns. Just getting on HF is a special treat!

Conclusion

Once again we have reached the closing wire and must sign off the printed page. Now it is your turn to talk. If you find this "getting started" series useful and would like to see more, let us know. Just send a short note or e-mail to the addresses listed at the beginning of the column. 73, Dave, K4TWJ

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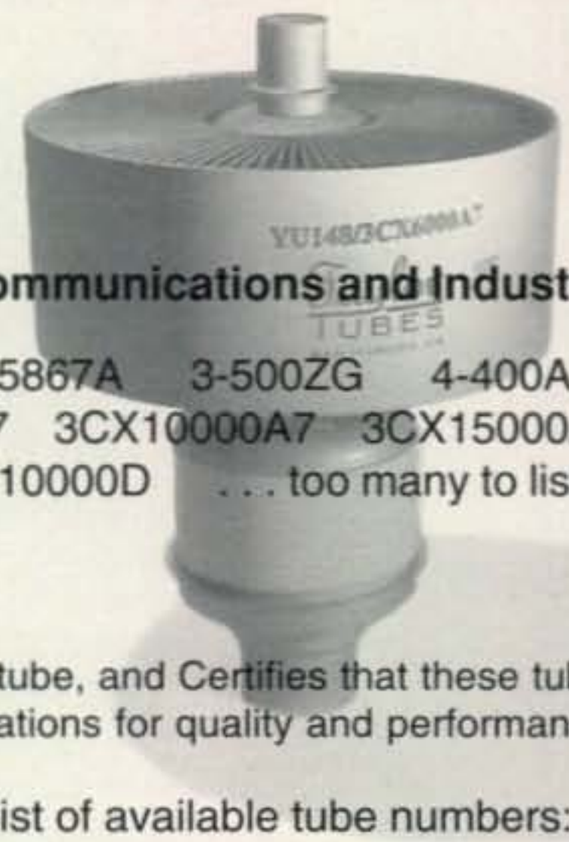

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BY JOE VERAS,* K9OCO

Ed Ladd and the Li'l Lulus

Ed Ladd was synonymous with 6 meters. His call, W2IDZ, was one of the first heard on the band when the 50–54-MHz allocation replaced the old 5-meter band (56–60 MHz) on March 1, 1946. He rode the crest of record-high sunspot numbers in the 1950s, encouraging others to enjoy the "Magic Band." Ladd is credited with the first confirmed two-way 6-meter QSO, was the first to earn the Worked All States award from the 2nd call area, and carried home-brew equipment along on 6-meter DXpeditions to places lacking 50-MHz activity. Some old-timers still recall his aurora-fluttery W2IDZ/VE8 signals from Canada's Northwest Territories. Today vintage-radio collectors, and even many VHF enthusiasts, remember him best for the equipment he designed and his company, Whippany Laboratories, built in the 1960s. This month's column takes a look at the Li'l Lulu 6-meter transmitter and receiver, as well as the man behind them.

Whippany Laboratories made only a few prototype Li'l Lulu receivers before canceling plans for a production model. (Photos © Joe Veras, 2004, all rights reserved)

The 1930s

The Li'l Lulus story runs longer than their brief appearance on the commercial stage. Ed Ladd's own ham history is a lengthy one as well, and not limited to the Whippany Labs equipment. It began in the days when the 5-meter band, even 10 meters, was referred to as UHF.

In the 1930s radio amateurs, as well as others studying the subject, tip-toed all around what we know and take for granted today about radio waves and propagation. It is difficult to construct a frame of reference that enables us to properly appreciate the accomplishments of that earlier age. Extensive tests were done at one time seeking to link the change in radio conditions with the rise and fall of relative humidity.[1] Others sought to plot improved signal paths against the track of thunderstorms. Just when it looked as if someone had discovered conclusive proof in one direction, an equally plausible answer to the same question arose in another. Of course, the 5- and 6-meter region being what it was, radio waves propagated via a number of methods. The spectrum was great for providing good, reliable local communication, but at times it supported long-distance contacts, too. These happened with sunspot-supported *F*-layer propagation, transequatorial propagation, sporadic-*E*, tropo-ducting, aurora, meteor scatter, or even courtesy of the ionization provided by a comet's tail.

Steadily improving equipment helped amateurs populating the *Ultra-Highs* reach out farther and more reliably as the 1930s progressed. Improvements in equipment, while beneficial, were not all voluntary. On December 1, 1938, the Federal Communications Commission issued an order requiring 5-meter transmitters to meet the same strict standards as those below 30 MHz. Modulated oscillators were banished to a new 2½-meter allocation at 112 MHz, created by the same order. Not all regulation need be confining. Cleaner, more stable signals from the new transmitters permitted the use of receivers having greater selectivity. In order to hear even more, 5-meter ops constructed better antennas.[2] The two coasts were not yet communicating on 5 meters, but great work was being done by amateurs in both locations and everywhere in between.[3] The band was an experimenter's paradise. The better equipment being developed allowed hams to experience, for the first time, a number of propagation phenomena. Ed Ladd was one of those at the center of this intense and exciting activity on 5 meters as the 1930s ended and the new decade began. World War II closed the band, and it reopened for business as 6 meters at war's end.

Post WW II and Beyond

Amateur radio wasn't the sole occupant of its new post-war spectrum. Commercial broadcasting had come up with something called *television,* TV

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e-mail: <k9oco@cq-amateur-radio.com>

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for short. If you operated 6 meters and lived in an area served by a television station on channel 2, add one more initial to the acronym: *I* for *TVI*. Channel 2 wasn't the only problem, although it probably was the worst case. Several of the higher numbered (VHF) channels were also possible trouble. All over the country, only the baldest of 6-meter men weren't pulling their hair out.

Ed Ladd crusaded with evangelical zeal to convince his fellow amateurs that 6-meter operation and television could coexist—even the dreaded channel 2! He built filters for both transmitters and TV sets, worked out improved amateur transmitter designs, and investigated different operating techniques. His findings were published in a lengthy two-part article that ended with encouragement to get on 6 meters and operate.[4] Elements of the original Lulu design were presented in the article, and both the homebrew and commercial versions of the transmitter followed that recipe.

The Li'l Lulu had been a popular 6-meter homebrew rig for ten years when the commercial transmitter made its debut in 1963.

Bill Pasternak, now WA6ITF, recalls an incident from his teenage, 6-meter days in Brooklyn, circa 1959. His homebrew transmitter knocked out TV channels 2 through 5 so effectively that operation was restricted to the late-night hours. One of his wee-hours QSOs was with nearby K2IGK, who described his own homebrew rig as TVI-free. Bill paid a visit to IGK's Brownsville QTH at the first opportunity and was astonished to see the transmitter operating in close proximity to an old Dumont television set. The astonishing thing was the complete lack of TVI. The transmitter was a Li'l Lulu.

Whippany Labs introduced the commercial version of the Li'l Lulu transmitter in mid-1963, turning out more than 250 units over the next several years. Its sibling receiver never did become a true production model, although half-a-dozen prototypes were fabricated for beta-testing. Features designed into the transmitter and Whippany's own literature seem to indicate the Lulus were meant to be an ensemble from the beginning. The receiver didn't appear in ads until early 1965, and vanished for good in mid-'66.

The transmitter was already well-known to 6-meter veterans before it made its commercial debut. Untold numbers of homebrew Li'l Lulus had been built since Ed Ladd penned the basic transmitter design a decade earlier. His immediate goals included creating a high-quality portable/mobile/fixed station rig offering good performance in a compact package. As a bonus, his design was recognized as a good construction project for radio clubs and many were built this way. Ladd was a longtime member of the Morris (NJ) Radio Club, and occasionally a homebrew Lulu transmitter with a Morris club pedigree still surfaces.[5]

The Name, The Performance

Where did the unlikely sounding name come from? The apocryphal tale is that amateurs encountering the early homebrew versions remarked, "She's a little lulu," commenting positively on the transmitter's compact size and spirited performance. In need of a name for his rig, Ladd decided to look no further than that, so Li'l Lulu it became. The term was not unknown outside amateur radio at the time, either. In 1935, Majorie Buell created a *Saturday Evening Post* cartoon whose title character was a young girl named Little Lulu. By the mid-1940s she was everywhere, appearing in comic books, a newspaper strip, and animated cartoons; she was even the spokesgirl for Kleenex™. Figurines and other Lulu merchandise abounded; remnants of the craze are still visible today in the collectibles section of online auction sites. Lulu's popularity may have had an influence on Ladd. I don't know. It *is* a cute name, though, and friendlier-sounding than the Black Widow appellation chosen by another manufacturer of 6-meter gear.

It's not so much what's in a name, but what's inside the box and how it performs on the air that matters with radios. The Li'l Lulu evolved as it progressed from club project to commercial product. Some constructors tailored the rig to suit their specific situations or made modifications to use parts already on hand. When the radio was used mobile, the car's electrical system might have dictated one's tube choice or filament wiring. Up until 1955 or '56 (depending upon brand) most American automobiles had 6-volt electrical systems, 12-volt thereafter. Early radios, or those built later but used in older cars, likely were wired for 6 volts. Constructors usually tried to stay faithful to the basics of the original design, however, in order to capitalize on its virtues.

Central to the original concept was the 6BH6 VFO, the grid circuit of which tuned 25–27 MHz, doubling in the plate circuit for output on 6 meters. The VFO's plate voltage and heater voltage were both regulated. The buffer's heater voltage was also regulated, but that was done only to properly load the 3TF4 regulator. A second 6BH6 acted as a buffer stage as well as a driver for the 12DQ7 power amplifier. The final amplifier's output circuit and the L/C circuit following the buffer were tuned by variable-capacitor sections ganged on the same shaft as the VFO's tuning cap. The rest of the transmitter's tuned circuits tracked with the VFO and gave the rig single-knob tuning as the operator moved about the band. The VFO was an effective solution to the harmonic-related TVI problems associated with transmitters using crystals or VFOs on lower frequencies. The ganged, sharply

tuned circuits were also effective in attenuating unwanted signals.

The final amplifier was link-coupled to the antenna through a low-pass filter. Once a preliminary tune-up was done using the PA and ANT TUNE controls to peak the power meter for a maximum reading, the VFO knob kept the transmitter's circuits in resonance when changing frequency. How far one could move about the band without readjusting the tune-up controls depended upon the reactance of the antenna. Link coupling was also beneficial in the reduction of unwanted signals. A half-wave, low-pass filter with attenuation ranging from 31 dB for the second harmonic to 59 dB at the fourth followed the tuned output link. The 12DQ7 final was cathode-keyed for CW. A 12V6 plate-modulated the 12DQ7 final using a form of Heising modulation. A 12AX7 provided two stages of speech amplification in a single tube envelope. Its input circuit accommodated either crystal or carbon microphones. Each type of mic had its own front-panel jack, wired for push-to-talk operation. AM phone was the dominant voice mode when Ladd created his design in the early 1950s. When the commercial version appeared, hams were already starting to look beyond basic CW and AM-only rigs.

The internal supply powered the rig on either 117 volts AC or 12 volts DC. The 12-volt supply functioned with either positive or negative ground, the former handy if your mobile operation took place in a vintage British sport car, where positive earth and Whitworth fittings were standard fare. Whether the volts were American or British, they needed to be higher than the nominal 12; the transmitter would perform as rated only if run on the 13+ volts supplied by the electrical system of a running automobile. The DC supply employed a pair of transistors in a switching circuit and a second winding on the transformer primary. The high-voltage supply used solid-state rectifiers. The transmitter's power supply also provided plate and filament voltage for the Li'l Lulu receiver at an accessory socket on the rear panel.

When the station's antenna feed line was connected to the transmitter's SO-239 connector, an internal relay switched the antenna to an adjacent BNC jack on receive, with only a short coax jumper to a companion receiver necessary to complete the station hookup. Another set of relay contacts lifted the receiver's B+ voltage on transmit, performing the mute function. The transmitter was rated for 6 watts output CW and 5 watts on AM. It measured $5^3/_8$" H $\times$ 8" W $\times$ $11^3/_8$" D and weighed $16^1/_2$ lbs. It sold through dealers for $225.00.

With the advantage of so many homebrew units already in the field, the commercial transmitter was quickly developed and brought to market. Magazine ads for the transmitter first appeared in April 1963; rigs were in owners' hands and on the air early that summer. No record exists of a similar homebrew or club-project Li'l Lulu receiver during the decade in which the homebrew transmitter was so popular. It seems clear that the transmitter and receiver were meant to be developed as a pair from the beginning of the commercial venture. Three sources place the number of transmitters manufactured at 255, while the total number of receivers is 5 or 6.

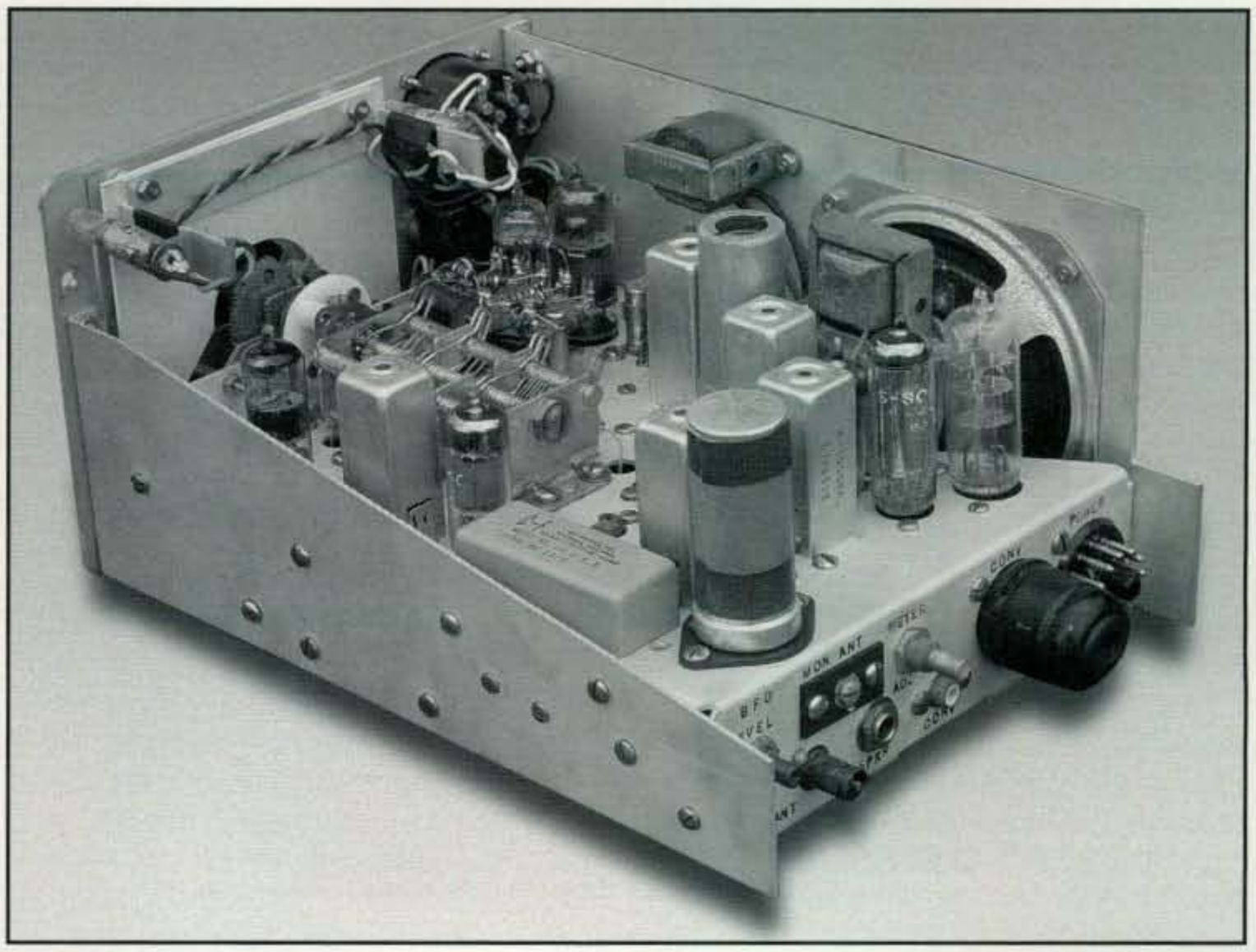
The Li'l Lulu Receiver

Each of the known receivers differs slightly from the others, with the most prominent changes being in the RF amplifier and AGC circuits. Several people who knew Ladd and were also familiar with the Lulu project say the receivers were all beta-test models used to try out the different circuits before a final design was chosen for production. It has also been suggested some receivers were made for buyers who agreed to purchase one together with a transmitter. Matching serial numbers give credence to this speculation, and Van, WØVAN, owns such a pair.

In size and style the receiver is a cosmetic match to the transmitter. It weighs less because it has no power supply. The 12-tube circuit lines up as follows: 12BZ6, RF Amplifier; 6BH6, Mixer; 6BJ6 1st IF; 6BH6 (6BJ6 in some receivers), 2nd IF; 12KL8, 3rd IF; 3TF4, Filament Regulator; OB2, 105-volt Regulator; 6BH6, VFO; 12AV6, 1st AF; 12BY7 (12DQ7 in some receivers), 2nd AF; 12AL5, Automatic Noise Limiter; 12BE6, Product Detector. A 4-kHz bandwidth crystal lattice filter ahead of the amplifiers in the 10-MHz IF provided selectivity. The Li'l Lulu also had a front-panel switch position for receiving WWV at 10 MHz and another to employ the receiver as an IF for converters.

The original transmitter manuals, which have a finished look about them and were obviously typeset, talk about the receiver as if it were accomplished fact. The manual gives instructions for hooking it up and using it with the transmitter. The receiver's manual has the look of having been composed on a typewriter and speedily reproduced, rather than being the product of a print shop.

The receiver made its first appearance in a magazine ad in January 1965 and was in that year's *ARRL VHF Manual* as well. It continued to show up in ads, either by itself or paired with the transmitter, for the next year-and-a-half



Despite being prototypes, the Li'l Lulu receivers are neatly wired and nicely finished. The two I've seen have internal speakers, contrary to what is stated in the ads.

Ed Ladd, W2IDZ

Francis E. Ladd was born on July 20, 1914 in West Lebanon, NH. He was first licensed as W1GHD in 1933 in Reading, MA. That same year, when he heard a station in Tennessee—a thousand miles away—calling CQ on 5 meters, he wasn't sure if he should believe it or not. This was at a time when older, wiser 5-meter heads were struggling to bridge the Boston, MA to Hartford, CT gap, a distance of barely a hundred miles. By 1935 he was W2IDZ, the call he would hold for nearly sixty years.

Ed Ladd's professional life revolved around communications, too. He worked as a Member of the Technical Staff at Bell Laboratories, spending much of his career at the facilities in Holmdel and Whippany, NJ. The second location seems to factor, tongue-in-cheek fashion, into the name Ladd chose for the company that manufactured the Li'l Lulu gear. His superiors at Bell probably would not have been amused at any implied connection.

Ladd worked on satellite networks in the Earth Station Design and Implementation Group and projects involving troposcatter communications. Also in his resumé is work on air/ground communications for both the Strategic Air Command and the presidential aircraft. Ed Ladd retired from Bell Laboratories in 1984 and died on July 9, 1994.

before disappearing completely. Apparently, during that time nothing more than the handful of prototypes was produced. A handwritten entry in one of WØVAN's transmitter manuals notes, "New from factory, 29 April 1967," so business may have continued on quietly for a while after the advertising ceased. Meanwhile, competing companies such as Clegg, Gonset, and even Heathkit were selling 6-meter transceivers—sideband transceivers—for the same money the Whippany pair cost. Part of the problem with producing the receiver was that Whippany Labs couldn't really charge as much as it cost to manufacture it. The initial production cost had been grossly underestimated, and after the long delays in getting it to market, the price point could not be both competitive and profitable. The old joke "We lose a little on each one but we make it up in volume" was not humorous to Ed Ladd. In the end, he chose not to compromise his effort by cheapening his product, or take an AM knife to a sideband gunfight.

In Closing . . .

At another time, in a different market, the Li'l Lulu line might have made a stronger showing. Ladd had already completed construction of a prototype 2-meter converter to use with the receiver and finished the design of a 220-MHz unit. A 117VAC/12VDC power supply, independent of the transmitter, had also been designed and constructed for the receiver.

Thanks to those who contributed to this column about the Li'l Lulus and their creator. The receiver in the photographs belongs to Bill Strangfeld, W8FIX. The transmitter is owned by Herman Cone, N4CH. Herman contributed much documentation on the transmitter as well. Michael Hopkins, AB5L, is the *Keeper of the Flame* on all things from 6 meters' Golden Age and his taking time to reminisce about ham radio experiences covering several decades. Thanks to Bill Pasternak, WA6ITF, for the report from TVI-land. Van Becker, WØVAN, who has a nice Li'l Lulu collection, gave thoughtful answers to my many questions and e-mailed sharp, detailed photos when that would do better than words.

73, Joe, K9OCO

Notes

1. Ross Hull, "Air Mass Conditions and the Bending of Ultra-High Frequency Waves," *QST*, June 1935, 13–15.
2. Ross Hull, "Extending the Range of Ultra-High Frequency Amateur Stations," *QST*, October 1934, 10–13.
3. Frank C. Jones (W6AJF), "Checking the Behavior of Ultra-High Frequency Waves," *QST*, March 1933, 14–17.
4. Francis E. Ladd (W2IDZ), "50 Mc. TVI – Its Causes and Cures" (Part I), *QST*, June 1954, 21–23; Ladd, "50 Mc. TVI – Its Causes and Cures" (Part II), *QST*, July 1954, 32–33.
5. <http://www.qsl.net/wb1asl/lulu.html>: A homebrew Li'l Lulu of unknown provenance, but perhaps typical of the many units constructed before the commercial transmitter came along.

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what's new

BY KARL T. THURBER, JR.,* W8FX

High-Power VHF/UHF Amps, Power Supplies, Telescoping Poles, and more

This month in your "What's New" column we'll again present some noteworthy radio gear, hamshack accessories, antennas and antenna accessories, portable and mobile goodies, and other fascinating items that have been rolled out recently. Let's dig right into "What's New."

Radio Gear

High-Power VHF and UHF Amplifiers from InterTronic Solutions. According to Peter Shield, G8BXM, of InterTronic Solutions, the Discovery series of high-power amplifiers takes advantage of the low-cost GS31/35 series of high-power ceramic/metal construction triode tubes. These hefty tubes help provide reliable, low-cost, high-power amplifiers for the 6- and 2-meter amateur bands (see photo A). The amplifiers, made by Linear Amp UK Ltd., and newly introduced to North America, reportedly produce more CW power from a desktop unit than anything else available at a similar price. The amplifiers use a very large integral toroidal power transformer and a high-power integral cooling fan for quiet and reliable high-power operation.

The 6- and 2-meter amplifiers produce 1200 or 1500 watts CW for long key-down periods with 80-100 watts of drive; 1.25-meter and 70-cm band versions of the amplifiers also are available. The Discovery series features a number of very useful features, including a "soft start" circuit and a three-minute startup timer. There also is protection for plate over-current, grid over-current, over-drive, and internal tube flashover. High-power RF coaxial changeover relays are built-in, as is an output power meter. The 1200-watt units sell for $2299 and the 1500-watt units sell for $2499; these prices include full shipping.

Linear Amp UK Ltd. is Europe's largest manufacturer of tube-based high-power amateur radio amplifiers. The full product line now is available in North America from InterTronic Solutions, Inc., 452 Aime-Vincent, Vaudreuil-Dorion, Quebec, Canada J7V 5V5 (450-424-5666; e-mail: <info@intertronicsolutions.com>; on the web: <http://www.intertronicsolutions.com>).

Photo A– The UK-based Discovery series of linear amplifiers distributed by InterTronic Solutions, Inc. are economically priced 1200- and 1500-watt desktop amplifiers for 2 and 6 meters. The 1200-watt units sell for $2299 and the 1500 watt units for $2499, shipping included. (Photo courtesy of InterTronic Solutions)

Accessories for the Shack

I-Mate from The BetterRF Company. Several years ago, we profiled the popular 706 Tune Control accessory. To recall, it's a handy plug-in device to enable the Tune/Call button on the ICOM 706 transceiver, offered by The BetterRF Co. The company's motto holds that it is "dedicated to providing superior products to the amateur community." Now the same crew—Gerry Smith, W6TER, and Jim Van Putten, W8QT—has introduced another product, the I-Mate (photo B). It's said to be ideal for chasing DX and contesting.

I-Mate implements the external selection of prerecorded voice and keyed messages for the ICOM 756 PRO II transceiver and keyed CW messages for the ICOM 746 Pro. The new accessory eliminates the necessity for shifting the display from an operating mode to a memory select mode simply to transmit the prerecorded message. Pressing one of four buttons on the I-Mate transmits the message associated with that button.

The I-Mate also provides a pulsed sine-wave oscillator for the tuning of high-power amplifiers and

Photo B– The BetterRF Co. has introduced a very handy accessory, the I-Mate, said to be ideal for chasing DX and contesting. I-Mate implements the external selection of prerecorded voice and keyed messages for the ICOM 756 PRO II transceiver and keyed CW messages for the 746 Pro. (Photo courtesy of The BetterRF Company)

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SS-12	10	12	1⅛ x 6 x 9	3.4
SS-18	15	18	1⅛ x 6 x 9	3.6
SS-25	20	25	2⅞ x 7 x 9⅝	4.2
SS-30	25	30	3¾ x 7 x 9⅝	5.0

MODEL SS-25M

DESKTOP SWITCHING POWER SUPPLIES WITH VOLT AND AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SS-25M*	20	25	2⅞ x 7 x 9⅝	4.2
SS-30M*	25	30	3¾ x 7 x 9⅝	5.0

MODEL SRM-30

RACKMOUNT SWITCHING POWER SUPPLIES

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25	20	25	3½ x 19 x 9⅝	6.5
SRM-30	25	30	3½ x 19 x 9⅝	7.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M	20	25	3½ x 19 x 9⅝	6.5
SRM-30M	25	30	3½ x 19 x 9⅝	7.0

MODEL SRM-30M-2

2 ea SWITCHING POWER SUPPLIES ON ONE RACK PANEL

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25-2	20	25	3½ x 19 x 9⅝	10.5
SRM-30-2	25	30	3½ x 19 x 9⅝	11.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M-2	20	25	3½ x 19 x 9⅝	10.5
SRM-30M-2	25	30	3½ x 19 x 9⅝	11.0

MODEL SS-12SM/GTX

MODEL SS-10EFJ-98

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GE MONOGRAM SERIES & MAXON SM-4000 SERIES
ICOM IC-F11020 & IC-F2020
KENWOOD TK760, 762, 840, 860, 940, 941
KENWOOD TK760H, 762H
MOTOROLA LOW POWER SM50, SM120, & GTX
MOTOROLA HIGH POWER SM50, SM120, & GTX
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SS-10MG, SS-12MG
SS-101F, SS-121F
SS-10TK
SS-12TK OR SS-18TK
SS-10SM/GTX
SS-10SM/GTX, SS-12SM/GTX, SS-18SM/GTX
SS-10RA
SS-12RA
SS-18RA
SS-10SMU, SS-12SMU, SS-18SMU
SS-10V, SS-12V, SS-18V

*ICS – Intermittent Communication Service

Photo C– Buffalo Woodworks creates several popular "laser engraved" custom hardwood plaques for amateur radio operators. These full-size plaques can be created from actual photos, graphics, certificates, and the like. "The License Plaque" is shown here. It's laser-engraved deep into the wood, and it comes with a Plexiglas cover. Other amateur-oriented products offered include laser-engraved bookmarks, callsign ID tags, key rings, and more. (Photo courtesy of Buffalo Woodworks)

antenna tuners. An alternate audio input is provided which you can use for a microphone, such as one of the Heil PROSET series (the PROSET unit plugs directly into the I-Mate without the Heil adapter). The I-Mate itself plugs directly into the transceiver's microphone jack and receives its power from the transceiver.

The new product works with CW and voice (CW only with the ICOM 746 Pro). You can send memories in the 756 Pro II while keeping the spectrum scope on the display. You have easier access to memories, less hand movement is required, and there's less stress on the finals in your linear amp while tuning with the Tune button. A separate PTT switch is provided to key the transceiver for digital modes, and the auxiliary input can be used for these modes. Also, a switch (MIC 1) is provided for switching between the standard 8-pin mic connector and auxiliary input (MIC 2).

The I-Mate's price is $74.95 plus $5.00 shipping/handling in the U.S. and Canada ($10.00 elsewhere). For more information, contact The BetterRF Co., 44 Crestview Lane, Edgewood, NM 87015 (1-800-653-9910; e-mail: <BetterRF@qth.com>; web: <http://www.BetterRF.com>).

PS-2500A High Power Power Supply from Watts Unlimited. Pennsylvania-based Watts Unlimited has introduced the PS-2500A High Voltage, High Current, High Power Power Supply (see fig. 1) for running those "big tubes." Reportedly the first power supply of its kind, the new 2.75 KV high-voltage power supply is specially designed for 3-500Z, GS-35b, and other similar high-power tubes. The unit is said to be ideal for new or old power amplifiers, and it accommodates line voltages from 200-260 VAC.

The PS-2500A, with its included enclosure, measures only about 11.75" × 5.62" × 5.00", and it weighs in at only 10 lbs. The power supply is priced at $698, wired and tested, or $585 in kit form, shipped postpaid in the lower 48 states.

For the convenience of prospective purchasers, the PS-2500A kit instruction manual and the PS-2500A user's manual are available free in PDF format, downloadable from the company's website. Schematics are not included in the free download.

The folks at Watts Unlimited have the motto "Engineering Solutions for Unique Problems." To that end, they say that you are welcome to talk with them about your high-voltage power-supply needs by calling them at 610-764-9514, or by sending e-mails to <wattsunlimited@aol.com>. They ask that you type "power supply" in the subject heading so they can find your query more easily amidst the "junk mail jungle."

Contact Watts Unlimited, 886 Brandon Lane, Schwenksville, PA 19473 (610-764-9514; e-mail: <wattsunlimited@aol.com>; on the web: <http://wattsunlimited.com>).

Hardwood Plaques from Buffalo Woodworks. Steve Landry, N2ZNU, owner of Buffalo Woodworks, creates a variety of popular "laser engraved" custom hardwood plaques for amateur radio operators. Made from solid cherry hardwood, these full-size plaques (9" × 12") can be created from actual photos, graphics, certificates, and the like. Steve invites you to check out his website and share your ideas with him to create a personalized plaque for you. Several plaques suitable for amateurs are available, including those depicted in photos C and D. They are good choices for unique gifts.

Photo D– Here's another popular amateur radio custom hardwood plaque offered by Buffalo Woodworks, "The Shack Plaque," which is made from your photo. (Photo courtesy of Buffalo Woodworks)

Other amateur-oriented products offered by Steve include laser-engraved bookmarks, callsign ID tags, key rings, and other accessories, which are depicted on his website. Products sold by Buffalo Woodworks are offered with a 100% satisfaction guarantee. For more information, contact Steve at Buffalo Woodworks, P.O. Box 148, Depew, NY, 14043 (1-866-283-9663; e-mail: <buffalowoodworks@aol.com>; web: <http://www.buffalowoodworks.com>). Club and dealer inquiries are welcome.

Antennas and Antenna Accessories

Lightning Guard from Electronic Specialty Products. To be completely candid, nothing will completely protect your home or radio equipment from a direct lightning hit. That kind of power can't be stopped, but it can be redirected. To that end, Electronic Specialty Products has introduced its innovative Lightning Guard product line.

Although not intended to replace surge protectors, the new Lightning Guard product line is said to offer superior protection for your gear with its innovative "U-Turn" technology. This patent-pending technology redirects the lightning surges traveling through power and communication lines directly to ground—simple, yet very effective. Short of unplugging every piece of electrical or electronic equipment, the Lightning Guard is said to offer the best solution for protecting your amateur radio, home theater, or computer equipment from lightning surges.

The Lightning Guard Model 100 (photo E) is designed to protect your transceiver from lightning when you are out of the radio shack. AC power, as well as your antenna coax, connect to the Lightning Guard so that your transceiver gets its AC power and its antenna connection through the Lightning Guard. There are relays in the unit that when energized pass AC power and the antenna through to the transceiver.

In the Manual mode, when the Lightning Guard is switched off, the relays de-energize, disconnecting AC power and the antenna. At the same time, both sides of the transceiver's AC power cord, and as well as the transceiver antenna input, are connected to the AC power ground wire. You also may connect an external ground if you so desire.

In the Auto mode, the main power switch is left in the on position. Then if there is a momentary interruption in AC power, as there often is with lightning

Photo E– The Lightning Guard Model 100 from Electronic Specialty Products is designed to protect your transceiver from lightning when you are out of the shack. AC power, as well as your antenna coax, connect to the Lightning Guard so that your transceiver gets its AC power and its antenna connection through the Lightning Guard. (Photo courtesy of Electronic Specialty Products)

Photo F– The SG-211 MiniSmartuner is designed to meet professional and amateur needs for a lightweight, portable antenna coupler for low-power applications, one which requires no external battery support. The SG-211 handles from 1 to 60 watts of input power over a frequency range of 1.8 to 60 MHz. (Photo courtesy of SGC)

storms, the relays de-energize, connecting everything to ground. The relays remain de-energized, and your equipment remains grounded, until manually reset. The Auto mode would only be used when it is desirable for AC power to remain on, but still have some degree of protection. If voltage spikes occur that are high enough to jump the relay contacts, they jump to ground and not through your transceiver. This feature will effectively protect your equipment from lightning, although as noted, with a direct hit, nothing can absolutely guarantee protection.

The Model 100 is designed to be used with one transceiver. It will handle AC current of 10 amps and maximum RF power of 200 watts. Standard SO-239 connectors are provided. The unit is priced at $80 plus $8.00 for Priority Mail shipping. Similar models are also available for computers and high-end TVs as well as.

For details, contact Electronic Specialty Products, LLC, 555 Seminole Woods Boulevard, Geneva, FL 32732 (phone 407-349-9150; e-mail: <cs@electronicspecialtyproducts.com>; on the web: <http://www.electronicspecialtyproducts.com>).

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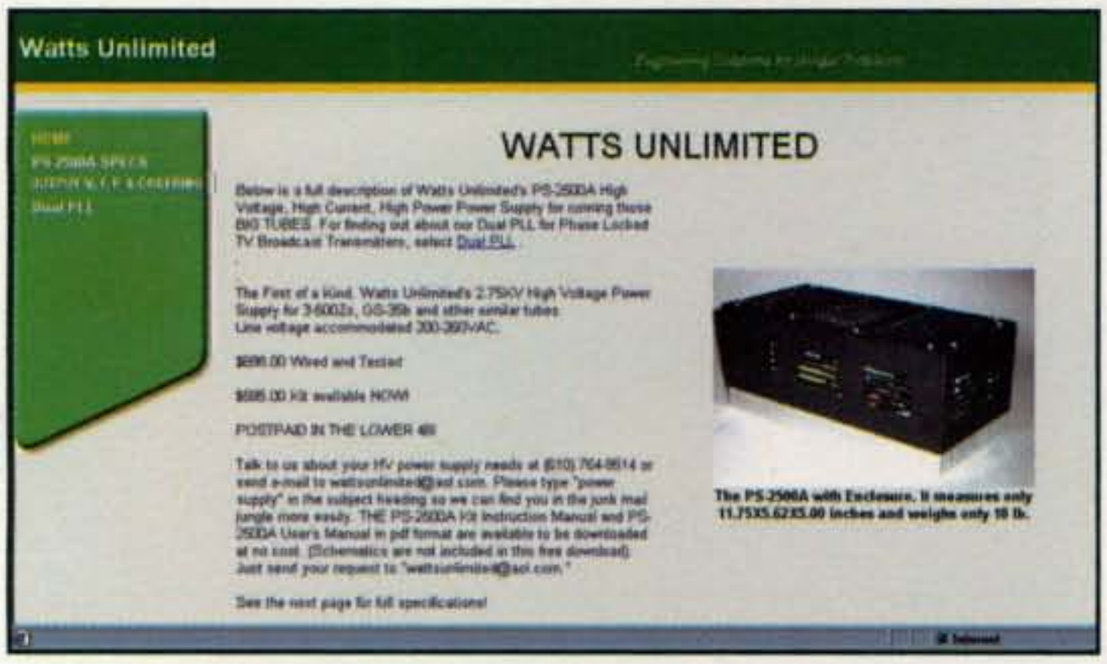

Fig. 1– Watts Unlimited has introduced the PS-2500A high-voltage, high-current, high-power power supply for running those "big tubes." Reportedly the first power supply of its kind, the new unit is said to be ideal for new or old power amplifiers, and it accommodates line voltages from 200–260 VAC. (Artwork from the Watts Unlimited website)

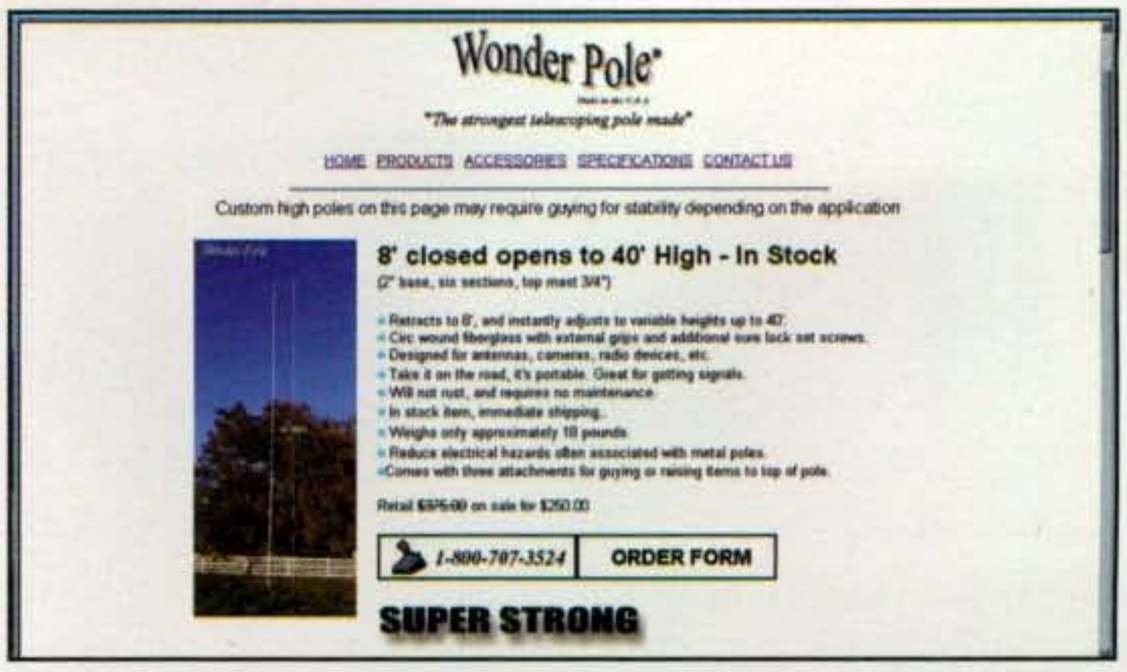

Fig. 2– The American Flag & Banner Co. makes a number of highly portable, super-strong telescoping poles under the Wonder Pole® name, several of which have excellent potential for amateur use. Available in several different sizes and configurations, the telescoping poles are made from sections of six-ply fiberglass tubing. (Graphic from the Wonder Pole website)

scoping pole made," makes a number of highly portable telescoping poles, several of which have great potential for amateur radio use (fig. 2). Available in several different sizes and configurations, the Wonder Pole® is a telescoping pole made from sections of six-ply fiberglass tubing.

According to the manufacturer, the poles are made of a sturdy composite material. The basic pole has a minimum fiberglass content of 70%, which is then circular wound with additional fiberglass strands that add tremendous strength to the pole and which prevent linear splitting commonly associated with other fiberglass poles. UV inhibitors are added to prevent degradation of the pole when exposed to the elements. The poles will not rust, and they require no maintenance.

Each section of the Wonder Pole is wrapped with two layers of the highest quality Nexus® veil, which prevents fiber bloom (slivers in your hand), and which preserves the integrity of the outer and inner surfaces. The pole has nesting sections that fit inside of one another, and they draw out to any desired height. Each section has exclusive "stop markers" to prevent extending the pole too far. The sections are secured into place by turning the "Sure Lock" grips that are factory molded onto the pole; glue or rivets are not used to keep the handles or fittings on the pole, since they may come loose.

The Wonder Poles are nonconductive, and they don't have any of the electrical hazards commonly associated with metal poles. You can replace any part of the pole or even add to the Wonder Pole at any time. The poles' low weight; superior strength; and available accessories, styles, models, and colors, make them excellent choices for a wide variety of amateur radio applications. Probably the best-suited poles for amateur use are the 21-ft. and 40-ft. Wonder Poles, which are priced at $129 and $250, respectively, as this is written. Some poles may require guying for stability, depending on the application.

For more information, contact American Flag & Banner Co., 5220 Lardon Road NE, Salem, OR 97305 (1-800-707-3524; e-mail: <info@wonderpole.com>; on the web: <http://www.wonderpole. com>).

SG-211 MiniSmartuner from SGC. SGC has been providing solutions for HF communication problems for some 34 years. Their transceivers and Smartuners™ have an enviable reputation for quality and reliability that has remained unmatched since the company's founding in 1970. Indeed, SGC's Smartuners have done much to "set the standard" for antenna tuning since their introduction over 25 years ago.

SGC has announced an innovative, new antenna coupler for low-power use. The SG-211 MiniSmartuner (photo F) is said to set a new standard for low-power operations by completely eliminating the need for an external power source. Also, SG-211 users have the freedom to erect nearly any antenna based on the requirements of the situation rather than having to carry a tuned antenna that can only be used in a limited number of ways.

The SG-211 is designed to meet professional and amateur needs for a lightweight, portable antenna coupler for low-power applications, one which requires no external battery support. The SG-211 is rated to handle from 1 to 60 watts of input power over a frequency range of 1.8 to 60 MHz.

SGC has kept the current requirements so low that the SG-211 can operate for five years on a single set of four alkaline AA batteries. This characteristic eliminates wire clutter and the need to carry extra power for an antenna coupler.

With all of these innovations, the SG-211 MiniSmartuner still remembers previous "tunes" by frequency, and it recalls them from memory instantly when going back to another frequency. Reportedly with over four times the matching range of competing products, the SG-211 provides excellent flexibility and the lowest possible cost in power consumption for portable work. Operation is so simple that all essential information is silk-screened on the case. The SG-211 MiniSmartuner is $179.95.

For more information, contact SGC Inc., 13737 SE 26th St., Bellevue, WA 98005 (1-800-259-7331; e-mail: <sgc@sgcworld.com>; on the web: <http://www.sgcworld.com>).

From the Bookshelf

New Pasternack Enterprises Coaxial and Fiber Optics Catalog. The latest printed 2004 version of the Pasternack Enterprises Coaxial and Fiber Optics Catalog (fig. 3) we received is, once again, a very thick one. It's seemingly one of the decreasing number of thick, reference-style radio and electronics catalogs that you can have sent to you by mail for convenient perusal, rather than having to go to a website to find what you're looking for.

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The Short Vertical Antenna and Ground Radial

by Jerry Sevick, W2FMI

This small but solid guide walks you through the design and installation of inexpensive, yet effective short HF vertical antennas. With antenna restrictions becoming a real problem, this book could keep you on the air!

Order No. SVERT $10.00

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by Jerry Sevick, W2FMI

The successor to the popular and authoritative *Baluns and Ununs*. Great deal of new tutorial material, also includes new designs, and crystal clear explanations of howand why they work.

Order No. 2BU $19.95

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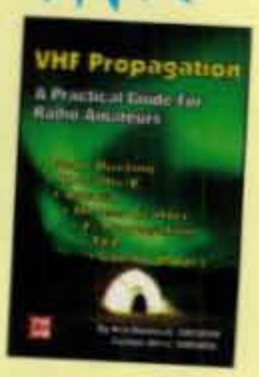

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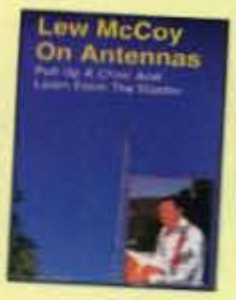

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Heathkit - A Guide to the Amateur Radio Products

by Chuck Penson, WA7ZZE

This greatly expanded Second Edition is a must for collectors and Ham history buffs, but is a terrific trip down memory lane for any Ham who was there or wishes he had been. Pick up this 328-page volume and you won't be able to put it down!

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Fig. 3– The latest 2004 version of the Pasternack Enterprises Coaxial and Fiber Optics Catalog is a very thick one. It's one of the decreasing number of thick, reference-style electronics catalogs that you can have sent to you by mail. You also can view and search the catalog online. (Courtesy of Pasternak Enterprises)

The comprehensive 2004 catalog includes thousands of different coaxial and fiber-optics related products, many of which Pasternack manufactures, along with considerable detailed technical data. The catalog shows a large selection of adapters, attenuators, matching pads, phase shifters, coax and coax assemblies, ferrite isolators, amplifiers, connectors, switches, power dividers, switches, terminations, tools, twinax, directional couplers, DC blocks, and considerably more.

The company also has brought its traditional paper catalog online. The easy-to-use website greatly assists you in "finding stuff": you can track down any part in the inventory without the need to know part numbers. The website also lets you look up any part in the inventory if you know the Pasternack number.

Contact Pasternack Enterprises, LLC, P.O. Box 16759, Irvine, CA 92623-6759 (949-261-1920; e-mail: <sales@pasternack.com>; on the web: <http://pasternack.com>). You may request a copy of the printed catalog online, or you may download an electronic (PDF file) version of the catalog from the website.

Short Bursts

Three Firms Team Up for the Amateur Radio Tower Market. Array Solutions, AN Wireless, and Nello Corporation have teamed up to better serve the amateur radio tower market. Nello Corporation of Nappanee, IN has selected Array Solutions and AN Wireless to be its exclusive distributors of amateur radio towers and tower supplies.

Nello Corporation, whose motto is "providing value through innovation," is a young, aggressive, and highly experienced steel-fabrication company focused on the wireless communications market. The firm now manufactures its own versions of the Rohn 25, 45, 55, and 65G series of towers and accessories, which are designed to the latest EIA/TIA (Electronic Industries Alliance/Telecommunications Industry Association) standards.

Jay Terleski, WXØB, and Dan Simmonds, KK3AN, of Array Solutions, and AN Wireless, respectively, say that their selection is the culmination of their efforts to demonstrate the value of Nello's towers and accessories in the amateur radio marketplace. The two companies offer more then just sales. They have been engineering, building, and safely erecting radio towers, as well as offering many valuable accessories and antennas for the amateur radio operator for many years.

For more information on the new alliance, contact Nello Corporation at 1-800-806-3556, on the web: <http://www.nelloinc.com>; Array Solutions at 972-203-2008, on the web: <http://www.arraysolutions.com>; or AN Wireless at 717-465-0519, on the web: <http://www.anwireless.com>.

Wrap-Up

That's all for this time, gang. Next time, more "What's New." See you then.

Overheard: Did you know that one of the very nicest and most appreciated things that you can give someone is something to feel important about?

73, Karl, W8FX

Note: *Listings in "What's New" are not product reviews and do not constitute a product endorsement by CQ or the column editor. Information in this column is primarily provided by manufacturers/vendors and has not necessarily been independently verified. The purpose of this column is to inform readers about new products in the marketplace. We encourage you to do additional research on products of interest to you.*

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our readers say

DX Opportunities for Tech-Plus Hams?

Editor, *CQ:*

While listening to several recent DXpeditions, I noticed something that I had to investigate. To start this admittedly quick and short investigation, I went to the AC6V website and looked at the DXpeditions link there. What I was looking for was any listing with posted operating frequencies/mode. While I was not able to find these for all the DXpeditions, the ones I did find generally followed the same pattern:

Band	CW	SSB	RTTY	PSK31	FM
160m	1822	.	.	.	.
80m	3502	3800*	.	.	.
40m	7002	7065	.	.	.
30m	10102	.	.	.	.
20m	14022	14195	14085	14071	.
17m	18072	18145	.	.	.
15m	21022	21295	21085	21071	.
12m	24892	24945	.	.	.
10m	28022	28495	28085	28121	29580

These seem to be pretty much a "standard" list of frequencies and modes that are followed by 99 percent of those which I could find. Can anyone tell me what I found from this list? This is what I noticed: Novice/Technician-Plus hams in the U.S. do not have any frequencies/modes available to them to contact these DXpeditions. (I can only speak for the U.S. amateur band plan, since I do not have copies of band plans from other areas immediately available.)

Some will argue that 28,495 kHz is inside the Novice/Technician-Plus 10-meter band, but remember that the "standard operating procedure" for SSB is that the DX station listens 5 kHz *above* its transmit frequency. That will put the Novice/Technician transmission right on 28,500, which is the upper limit of their portion of 10 meters. Since any mode occupies some bandwidth, half of the transmission would be above 28,500 and thereby illegal.

I believe this eliminates about one quarter of current U.S. licensees. Doesn't sound fair to me. There are those who will argue that if you want this, then upgrade to General. I believe that if you include them, then they will *want* to upgrade. Don't dangle a carrot; give them a taste of the honey!

David Edgar, N7VRZ

Oops Oops...

Some days, it just isn't worth getting out of bed in the morning. In our correction last month of our embarrassing substitution of "watts" for "ohms" in WA5VJB's July "Antennas" column, we noted that it came about from trying "to replace the 'ohm' symbol (W)..." No, we're not really *that* stupid, although at this point it would be hard to disagree with those who feel otherwise. Yes, we know that the symbol for "ohm" is the Greek letter Omega—Ω—we just seem to be having trouble getting it to print that way.

So, just to clarify our clarification:

W = Watts = unit of power
Ω = Ohms = unit of resistance

We know this. We've known it all along. Hopefully, we're done messing it up. *—the editors*

dx

BY CARL SMITH,* N4AA

Fall and Early 2005 DXpeditions

It has been an interesting summer for DX and other things, too. I won't bore you with all the little details, but following is just a short commentary of possible interest to at least some of you.

In early June, a visit to my family doctor led to an appointment with the local cardiologist group for a stress test. Upon "miserably" failing the test, I was immediately taken to the local hospital, where I underwent the standard heart catheter procedure. This revealed that I had a 99.9% blockage of the main artery, nicknamed "the widowmaker." The doctors immediately performed the procedure of inserting a balloon and a stent to open that blockage. Everything worked and I came home a few days later with a new outlook on life. I had smoked for 48 years. That came to an immediate halt. I had never done any real physical exercise. I will now exercise regularly. My eating habits typically were eat whatever, whenever. I've had to make adjustments in those habits, too.

I am now 64 years old and had *never* had a heart problem, nor had any of my family. I mention all of this for those of you who might be in a similar situation. I never gave much thought to the smoking, but I now believe that it was a contributing factor. If you smoke, I urge you to seriously consider stopping. Exercise is something we all should be doing. Diet is also important.

I've enjoyed being around for these 64 years and hopefully will be around for many more. My chances have greatly improved following this "wake-up call." Just today I got a report of another Silent Key. More and more DXers are leaving us, and I don't like reporting such things. More important, I don't like reporting them when it's folks who could have been around a lot longer. Please think about the things I've said about my own sit-

Don, K4ZA, and Ken, K4DXA, put the finishing touches on the installation of this 75-meter Yagi on top of the 130-ft. tower at the QTH of Kent Miller, K4MK. (Photo courtesy of K4MK)

*P.O. Box DX, Leicester, NC 28748-0249
e-mail: <n4aa@cq-amateur-radio.com>

The WPX Program

CW

3139 ..... G4PWQ	3141 ..... W8DA
3140 ..... OK1FED	

SSB

2908 ..... EA1BZ	2911 ..... JA6KTY
2909 ..... 7N4BAI	2912 ..... PA9TT
2910 ..... W8DN	

Mixed

1943 ..... YEØANA	1944 ..... W8DN

CW: 800 W8DN. 900 WD6CKT. 1400 WA3GNW.
SSB: 550 W8DN. 850 KU4BP. 4250 F6DZU.
MIXED: 1100 W8DN, W2EZ, AB5C. 1850 KØKG. 2050 WA3GND. 3900 WB2YQH.

10 Meters: 7N4BAI
Europe: PA9TT
Asia: 7N4BAI, 7L2KOZ

Award of Excellence Holders: N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GQ, W4BQY, IØJX, WA1JMP K0JN, W4VQ, KF2O, W8CNL, W1JR, F9RM, W5UR, CT1FL, WA4QMQ, W8ILC, VE7DP, K9BG, W1CU, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SMØDJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, I8YRK, SMØAJU, N5TV, W6OUL, ABØP, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POF, DJ4XA, IT9TQH, ONL-4003, W5AWT, KBØG, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1PO, K9LNJ, YBØTK, K9QFR, 9A2NA, W4UW, NXØI, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MC, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, WØULU, K9XR, JAØSU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, KZ1R, CT4UW, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, OE1EMN, W9IL, S53EO, DF7GK, I7PXV, S57J, EA8BM, DL1EY, KØDEQ, KUØA, DJ1YH, OE6CLD, VR2UW, 9A9R, UAØFZ, DJ3JSW, HB9BIN, N1KC, SM5DAC, RW9SG, WA3GNW, S51U, W4MS, I2EAY, RAØFU, CT4NH, EA7TV, W9IAL, LY3BA, K1NU, W1TE, UA3AP, EA5AT, OK1DWC, KX1A, IZ5BAM, W4BP, K4LQ, KØKG, DL6ATM, VE9FX, DL2CHN, W2OO, AI6Z, RU3DX, WB9IHH, CT1EEN, G4PWA, OK1FED, EU1TT.

160 Meter Endorsement: N4MM, W4CRW, K5UR, VE3XN, DL3RK, OK1MP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR, W5UR, W8RSW, W8ILC, G4BUE, LU3YL/W4, NN4Q, VE7WJ, VE7IG, W9NUF, N4NX, SMØDJZ, DK3AD, W3ARK, LA7JO, SMØAJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, UR1QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH, N8JV, ONL-4003, W5AWT, KBØG, F6BVB, YU7SF, DF1SD, K7CU, I1POR, YBØTK, K9QFR, W4UW, NXØI, WB4RUA, I1EEW, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, WX3N, WBØDD, IØRIZ, I2MQP, F6HMJ, HB9DZZ, K9XR, JAØSU, I5ZJK, I2EOW, KS4S, KA5CLV, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY, KØDEQ, DJ1YH, OE6CLE, HB9BIN, N1KC, SM5DAC, S51U, RAØFU, UAØFZ, CT4NH, W1CU, EA7TV, LY3BA, RW9SG, K1NU, W1TE, UA3AP, OK1DWC, KX1A, IZ5BAM, W4GP, DL6ATM, W2OO, RU3DX, WB9IHH, G4PWA, OK1FED, EU1TT.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if airmail desired) to "CQ WPX Awards," P.O. Box 593, Clovis, NM 88101 USA. *Note: WPX will not accept prefixes/calls which have been confirmed by computer-generated electronic means.*

Please Note: As of February 2004, the price of the 160 meter bar for the Award of Excellence is now $6.50.

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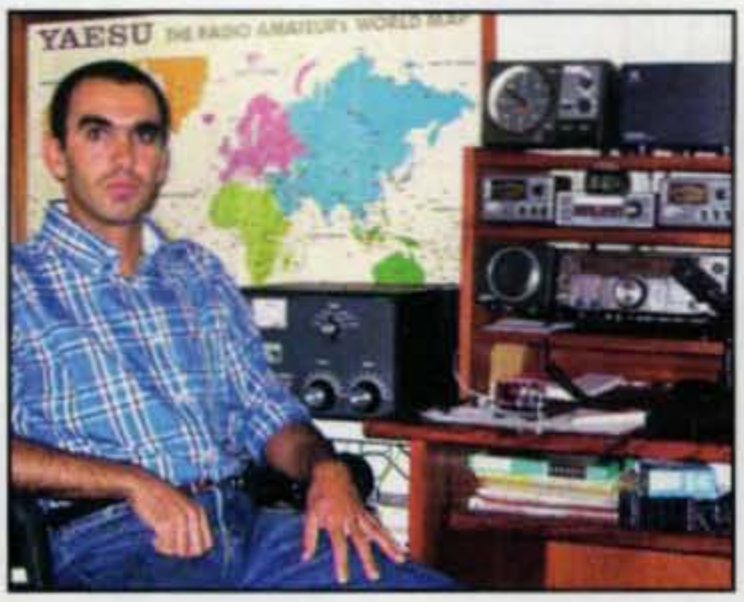
uation and consider how they might apply to your own life.

Future DXpeditions

DXing has been just a bit sluggish this summer. With the world situation being what it is, there aren't a lot of DXpeditions, and the declining solar cycle isn't helping. The higher bands are pretty quiet, but we still have 20 and 17 meters contributing a lot of good DX for those willing to go after it. The fall is shaping up to be active, with a number of DXpeditions being announced for October. Then we have the Peter I DXpedition being "re-announced" for early 2005. Here's the details on what's coming up as of early July.

Lord Howe Update *(via Bill Horner, VK4FW).* All accommodations have been finalized, along with plane flights. We will arrive on October 9 at approximately 1445 local time. By the time we get checked in and gather all the equipment, it will be getting close to dark. However, we hope to have one station on the air very quickly, followed soon thereafter by a second one. The rest will be installed when daylight breaks.

Because of severe weight restrictions, we have to boat freight most of the equipment in the next month.



Jose, CT3MD, tells us his favorite bands are 20 and 17 meters. However, he does operate all the bands, but only on SSB right now. He is very interested in Worked All States and U.S. counties. Jose needs a KH6 to complete his WAS, with 46 states confirmed. He says, "I have worked about 1400 U.S. counties and look for many more." (Photo courtesy of John, KDØJL)

Donations to help offset this cost would be greatly appreciated and may be sent directly to: Oceania Amateur Radio DX Group, Inc., P.O. Box 513, Nambour, 4560, Australia.

Operators confirmed are as follows: YLs: SSB Vicki, VK2IVK; SSB and RTTY specialist Elvira, IV3FSG.

Heinz, DL7HKL, was licensed for VHF/UHF in 1998. He upgraded in October 2000 and says his favorite HF bands are 40, 20, and 15 meters using a Yaesu FT-101ZD, along with his FT-900. His antenna, shown separately, is a Fritzel FBDX-706 with seven elements for six bands on a 12-meter tower. He also has an FD4 multi-band dipole for other bands. (Photo courtesy of KDØJL)

The antenna/tower of Heinz, DL7HKL. (Photo courtesy of KDØJL)

OMs: SSB Eric, VK4NEF, and Mike, VK3SU; SSB/CW/RTTY Carlo, IK6CAC; SSB/CW Bill, VK4FW.

As of this writing there are still two vacancies, one YL and one OM. If you are interested, please contact me, Bill, VK4FW, right away at: <vk4fw@westnet.com.au>.

We will endeavor to operate four stations on HF and 6 meters on the following frequencies:

CW: 1807, 3507, 7007, 10107, 14007, 18077, 21007, 24897, and 28007 kHz.

SSB: 3790, 7045, 14195, 18140, 21245, 24945, and 28445 kHz.

6 meters: 50.100 MHz for CW/SSB.

Any questions/suggestions should be directed to: <vk4fw@westnet.com.au>.

Chesterfield Island (TX/C). Chris, DL5NAM, and the group who brought us STØRY are now planning their next trip, this time to activate Chesterfield Island (TX/C) on all bands 160 through 6 meters on CW/SSB and RTTY.

The group was awarded a trophy for the best DXpedition from the Southwest Ohio DX Association, a trophy from the

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The WAZ Program

10 Meter SSB

567 ..... W6YOO

15 Meter SSB

612 ..... IZØCKJ

15 Meter CW

322 ..... SM3NXS 323 ..... K9ALP

20 Meter CW

545 ..... SM3NXS

160 Meters

199 ..... K1UO

All Band WAZ SSB

4921 ..... 4X6ZI 4924 ..... EA1EAU
4922 ..... EA8AYV 4925 ..... YBØIR
4923 ..... EA7HY 4926 ..... K5ADI

Mixed

8315 ..... KI7WO 8317 ..... YBØIR
8316 ..... JM1MMD

All CW

428 ..... HAØIH 430 ..... EA1CEZ
429 ..... DF1XM

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Floyd Gerald, N5FG, 17 Green Hollow Rd., Wiggins, MS 39577. The processing fee for all *CQ* awards is $6.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $12.00 for nonsubscribers. Please make all checks payable to Floyd Gerald. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. N5FG may also be reached via e-mail: <n5fg@cq-amateur-radio.com>.

CQ DX Awards Program

SSB

2436 ..... VE6MRT

CW

1061 ..... K9OHI

RTTY

37 ..... N5ZM

SSB Endorsements

320 ..... DU1KT/335 275 ..... KU4BP/275
320 ..... K1HDO/331 200 ..... VE6MRT/205
310 ..... XE2NLD/310 28 MHz VE6MRT

CW Endorsements

320 ..... K1HDO/329

RTTY Endorsement

310 ..... N5ZM/310

The basic award fee for subscribers to *CQ* is $6. For nonsubscribers, it is $12. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00 each plus SASE. Updates not involving the issuance of a sticker are free. All updates and correspondence must include an SASE. Rules and application forms for the CQ DX Awards may be found on the <www.cq-amateur-radio.com> website, or may be obtained by sending a business-size, self-addressed, stamped envelope to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. Currently we recognize 335 active countries. Please make all checks payable to the award manager.

5 Band WAZ

As of July 1, 2004, 658 stations have attained the 200 zone level and 1400 stations have attained the 150 zone level.

New recipients of 5 Band WAZ with all 200 zones confirmed:

None

The top contenders for 5 Band WAZ (zones needed, 80 meters):

N4WW, 199 (26)
W4LI, 199 (26)
K7UR, 199 (34)
WØPGI, 199 (26)
W2YY, 199 (26)
VE7AHA, 199 (34)
IK8BQE, 199 (31)
JA2IVK, 199 (34 on 40m)
NN7X, 199 (34)
IK1AOD, 199 (1)
DF3CB, 199 (1)
GM3YOR, 199 (31)
VO1FB, 199 (19)
KZ4V, 199 (26)
W6DN, 199 (17)
W6SR, 199 (37)
W3NO, 199 (26)
K4UTE, 199 (18)
HB9DDZ, 199 (31)
RU3FM, 199 (1)
HB9BGV, 199 (31)
N3UN, 199 (18)
OH2VZ, 199 (31)
K5MC, 199 (22)
W1JZ, 199 (24)
K2UU, 199 (26)
W1WAI, 199 (24)
W1FZ, 199 (26)
SM7BIP, 199 (31)
PY5EG, 199 (23)
SP5DVP, 199 (31 on 40)
W8AEF, 199 (40)
K8RR, 199 (26)
UU5JR, 199 (4)
W8GF, 199 (22)
N4NX, 199 (26)
N4MM, 199 (26)
EA7GF, 199 (1)
N4PQX, 199 (26)
DL2KQ, 199 (31)
JA5IU, 199 (2)
CT3DL, 199 (26)
EA5BCX, 198 (27, 39)
G3KDB, 198 (1, 12)
KG9N, 198 (18, 22)
JA1DM, 198 (2, 40)
9A5I, 198 (1, 16)
K5PC, 198 (18, 23)
K4CN, 198 (23, 26)
G3KMQ, 198 (1, 27)
N2QT, 198 (23, 24)
OK1DWC, 198 (6, 31)
W4UM, 198 (18, 23)
US7MM,198 (2, 6)
K2TK, 198 (23, 24)
K3JGJ, 198 (24, 26)
W4DC, 198 (24, 26)
N4XR, 198 (22, 27)
RU3DX, 198 (1, 6)
N6HR/7, 198 (34, 37)
OE2LCM, 198 (1, 31)
W7SX, 198 (18, 23)
HA1RW, 198 (1, 31)
WK3N, 198 (23, 24)
HA9RT, 198 (1, 31)
W9XY, 198 (22, 26)

The following have qualified for the basic 5 Band WAZ Award:

W6YOO (186 zones)
S5EMJ (164 zones)

Endorsements:

UT5JAJ (200 zones) UY5AA (200 zones)
GØJHC (200 zones)

****Please note: Cost of the 5 Band WAZ Plaque is $80 ($100 if airmail shipping is requested).**

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Floyd Gerald, N5FG, 17 Green Hollow Rd., Wiggins, MS 39577. The processing fee for the 5BWAZ award is $10.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $15.00 for nonsubscribers. An endorsement fee of $2.00 for subscribers and $5.00 for nonsubscribers is charged for each additional 10 zones confirmed. Please make all checks payable to Floyd Gerald. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. N5FG may also be reached via e-mail: <n5fg@cq-amateur-radio.com>.

Bavarian Contest Club, and the trophy from "425 DX News" for the best DX-pedition worldwide. All of these trophies and positive comments from over 53,000 visitors to the group's website gave them the needed push to start planning this trip.

Chris reports license and flight tickets are in hand, the vessel is booked, and the team is looking forward to the trip. He adds, "This DXpedition will be *very* expensive, with a calculated budget of $45–50,000 U.S., and they ask for your help to fund the trip.

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CQ DX Honor Roll

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CW

K2TQC 334	K4MQG 334	N5FG 333	K6LEB 331	YU1TR 330	K4JLD 327	W6SR 323	YT1AT 317	WG7A 295
K2FL 334	EA2IA 334	N7RO 333	VE3XN 331	W4UW 330	W6OUL 327	N5ZM 323	K8JJC 315	KE3A 295
K9BWQ 334	PA5PQ 334	K4CN 333	W1WAI 331	G3KMQ 329	IT9TQH 326	KUØS 322	CT1YH 313	K4IE 291
K9MM 334	K3UA 334	W4MPY 333	K2JF 331	KZ4V 329	I2EOW 326	KE5PO 322	PY4WS 313	KD8IW 288
W7OM 334	DL3DXX 334	PY2YP 333	K3JGJ 331	N5HB 329	W7IIT 326	K6CU 321	N1HN 313	EA3BHK 282
K2JLA 334	K2ENT 334	W8XD 333	PT2TF 331	W9IL 329	SM5HV/HK7 326	HA5DA 321	W6YQ 313	YC2OK 282
N7FU 334	OK1MP 334	W2VJN 333	N4CH 331	K1HDO 329	W4LI 325	IKØTUG 321	K9DDO 312	DJ1YH 281
K2OWE 334	NC9T 334	KA7T 332	WA8DXA 331	K7JS 328	I5XIM 325	VE7DX 320	W3II 312	WA4DOU 281
N4MM 334	WB5MTV 333	WØJLC 332	K9IW 331	K9OW 328	K5UO 325	IKØADY 320	UA9SG 309	XE1MD 278
F3TH 334	W7CNL 333	K8LJG 332	W2UE 330	K8PV 327	IK2ILH 325	WG5G/QRPp 320	KF8UN 308	EA2CIN 278
F3AT 334	YU1HA 333	YU1AB 332	I4LCK 330	W4QB 327	N5FW 325	N7WO 320	YU7FW 306	I3ZSX 276
DJ2PJ 334	IT9QDS 333	K5RT 332	VE7CNE 330	I1JQJ 327	9A2AA 325	F5OIU 320	LU3DSI 302	G3DPX 275
WA4IUM 334	G4BWP 333	YU1AB 332	4N7ZZ 330	I4EAT 327	N4OT 325	HA5NK 319	N1KC 302	
W4OEL 334	K4CEB 333	NØFW 332	W6DN 330	DL8CM 327	LA7JO 324	F6HMJ 319	KH6CF 301	
W2FXA 334	K4IQJ 333	N4AH 332	K7LAY 330	SM6CST 327	K1FK 324	OZ5UR 319	VE7KDU 300	
N4JF 334	WØHZ 333	HB9DDZ 332	WB4UBD 330	N4KG 327	9A2AJ 323	G3KMQ 317	KØHQW 299	

SSB

K6YRA 335	4Z4DX 335	W5RUK 334	KSØZ 332	ZL1AGO 329	IT9TQH 327	K5NP 322	CT1YH 311	K7ZM 292
K2TQC 335	N7RO 335	K4CN 334	LU4DXU 332	W9OKL 329	DK5WQ 327	WA4ZZ 322	YV5NWG 311	OA4EI 292
W6EUF 335	IØZV 335	EA3KB 334	VE4ROY 332	I2EOW 329	UY5XE 327	WN9NBT 322	LU3HBO 310	K7ZM 292
K2JLA 335	EA2IA 335	N4CH 334	W7FP 332	VE7DX 329	KE5K 327	WW1N 322	HA6NF 310	K1RB 292
K4MQG 335	IN3DEI 335	K3UA 334	K9HQM 332	W2FGY 329	I1JQJ 327	W6OUL 322	WA5MLT 310	KØOZ 291
IK1GPG 335	EA4DO 335	K4JLD 334	CT1EEB 332	CT1EEN 329	CP2DL 327	N3RX 321	XE2LV 310	W9ACE 291
K5OVC 335	PA5PQ 335	N5ZM 334	W2FKF 332	CT1CFH 329	NI5D 327	XE1CI 321	XE2NLD 310	I3ZSX 290
NØFW 335	K9OW 335	PY2YP 334	CT3BM 332	EA1JG 329	EA1JG 327	CT1ESO 321	EA3BHK 307	WØROB 287
K9MM 335	W6DPD 335	AA4S 334	DL9OH 331	KE4VU 328	W6SR 326	EA8TE 321	RW9SG 307	KKØDX 285
W6BCQ 335	XE1VIC 335	CT3DL 334	N2VW 331	K5UO 328	N4KG 326	W6MFC 321	W9IL 306	VE7HAM 285
XE1AE 335	K2ENT 335	NC9T 334	YV1JV 331	KF8UN 328	K7TCL 326	KD5ZD 321	XE1MDX 305	F5RRS 284
W7OM 335	OK1MP 335	W9SS 334	WA4WTG 331	WØULU 328	W9HRQ 326	N4CSF 320	EA5OL 305	N8LIQ 284
KZ2P 335	IZ6GPZ 335	VE7WJ 334	W8KS 331	K1EY 328	W4QB 326	N4HK 320	WB2AQC 305	WØIKD 283
IK8CNT 335	K1UO 335	VE2PJ 334	YV5IVB 331	KZ4V 328	K8PV 326	KØFP 320	VE7SMP 305	KBØRNC 282
VK4LC 335	I8KCI 335	W3AZD 334	KX5V 331	XE1D 328	DL6KG 326	EA7TV 320	KC4FW 304	WN6J 281
OE7SEL 335	I8LEL 335	YZ7AA 334	K3JGJ 331	KD8IW 328	W4LI 326	SV1RK 320	K3BYV 303	IK8TMI 281
VE3MR 335	DU9RG 335	4N7ZZ 333	N5ORT 331	KE3A 328	WR5Y 326	N1KC 320	YC2OK 303	F5JSK 281
VE3MRS 335	DU1KT 335	KE5PO 333	PT2TF 331	W9IL 328	N1ALR 326	W5GZI 320	WB2NQT 303	KA5OER 280
K4MZU 335	WDØBNC 334	VE1YX 333	CT1AHU 331	K3LC 328	HB9DDZ 326	SV3AQR 320	VK3IR 303	KK5UY 280
OZ5EV 335	K2FL 334	I4LCK 333	EA3JL 331	K8DXA 328	WA4JTI 325	WA4DAN 319	KK4TR 303	F5INJ 279
N7BK 335	WØYDB 334	W2JZK 333	K9IW 331	LU5DV 328	KC4MJ 325	CE1YI 318	VE7KDU 302	K7SAM 279
K7LAY 335	W4UW 334	K8LJG 333	K1HDO 331	I1EEW 327	PY2DBU 325	W5OXA 317	W2GZI 302	EA3CWT 278
ZL3NS 335	K9BWQ 334	VE4ACY 333	W6DN 330	SV1ADG 327	IKØIOL 325	YV4VN 317	N5QDE 302	VE2DRN 277
N4MM 335	W4NKI 334	KØKG 333	K8CSG 330	DL8CM 327	YT1AT 325	EA5GMB 317	KD4YT 302	9A9R 277
OZ3SK 335	WB4UBD 334	W4WX 333	YV1CLM 330	F9RM 327	K7HG 324	KE4SCY 317	SV2CWY 300	W6UPI 276
K7JS 335	W4UNP 334	VE2WY 333	LA7JO 330	XE1MD 327	AC7DX 324	K6RO 316	4X6DK 300	Z31JA 275
XE1L 335	W8AXI 334	WB3DNA 333	AB4IQ 330	I4EAT 327	KØHQW 324	N5HSF 316	YT7TY 300	G4URW 275
YU1AB 335	VE2GHZ 334	K9PP 333	AE5DX 330	W3GG 327	EA3BKI 323	N8SHZ 316	K4IE 300	VE2AJT 275
OE3WWB 335	OE2EGL 334	W2CC 333	KB2MY 330	AA6BB 327	K4JDJ 323	WZ3E 314	W4PGC 300	4Z5FL/M 275
K5TVC 335	WA4IUM 334	DL3DXX 333	K3PT 330	SM6CST 327	W6WI 323	IZ6CST 314	K6GFJ 299	KU4BP 275
N5FG 335	K5RT 334	EA3BMT 333	ZL1BOQ 330	WD8MGQ 327	EA3CYM 323	K9YY 313	AC6WO 297	
DJ9ZB 335	W2FXA 334	EA3EQT 333	KW7J 330	CX4HS 327	F6BFI 322	NØMI 313	WA1ECF 295	
PY4OY 335	N4JF 334	YV1KZ 332	WS9V 329	IØSGF 327	K6CF 322	W7GAX 312	KW1DX 295	
VE3XN 335	W6SHY 334	YV1AJ 332	K2JF 329	IT9TGO 327	LU7HJM 322	VE3CKP 311	N5WYR 293	

RTTY

K2ENT 333	K3UA 327	EA5FKI 320	W2JGR 316	OK1MP 312	KE5PO 297	I2EOW 291	W4QB 280	YC2OK 280
WB4UBD 330	NI4H 325	N5FG 318	G4BWP 312	PA5PQ 311	W4EEU 297	I1JQJ 289		

The team will consist of Chris, DL5NAM; Jan, DJ8NK; Hawa, DK9KX; Dieter, DJ9ON; Dieter, DL3KDV; and Heye, DJ9RR. One more operator is needed to share the cost.

If you have any questions, please contact Chris Sauvageot, DL5NAM, Guttenburg 19, D-91322 Grafenberg, Germany (telephone: ++49-9192-998967; fax: ++49-9192-998968; e-mail: <dl5nam@arrl.net>).

Peter I in 2005 *(via Ralph Fedor, KØIR, and Bob Allphin, K4UEE).* The 2005 DXpedition to Peter I Island, Antarctica, is a go for late January 2005 during the next Austral summer. You may recall that this DXpedition was postponed last year due to unforeseen transportation difficulties. Now the team has contracted with a newly refurbished icebreaker formally in service with the Chilean Navy. The 83-meter long vessel will transport the operating and support teams to Peter I; move the equipment, shelters, life support, and personnel ashore via helicopter; and then remain offshore for the proposed 14-day radio operation. This plan dramatically increases the safety factor for the team and increases the opportunity for a successful radio operation.

This is a very expensive undertaking. It will be 70% funded by the team members. Additional financial sponsors are being sought. Equipment sponsors are in place. More details as to team members, sponsors, history, photos, etc., can be found on the DXpedition website: <www.peterone.com>. Additional information will be forthcoming.

Software Survey

Just for fun, I ran a little "unofficial" survey on computer software for logging and contesting a few months ago in "QRZ DX." There wasn't a huge response, but a few hundred DXers did participate and gave some interesting insight on what is being used by active DXers/contesters. This is not a "commercial" for any of the software listed, and does not represent the endorsement by me nor *CQ* magazine.

QSL Information

3A/IK1WEG via IK1WEG
3A/IZ1DSH via IZ1DSH
3A/IZ1GDB via IZ1GDB
3B8/DL3L via DL3LBP
3B8GL via 3B8CF
3D2AZ via JA2AZX
3D2EA via EB2AYV
3D2FO via JR2FOR
3D2KL via KL1X
3D2KQ via DL4KQ
3D2MM via RK3AD
3D2NK via JA2AAU
3D2OA via DL5OAB
3D2RW via ZL1AMO
3D2RW/R via ZL1AMO
3D2XX via W6YOO
3D2ZF via DK2ZF
3W2TXR via JA2TXR
3Z0BLY via SP2PMW
3Z8EU via SP8MI
4C2X via XE2K
4D2X via 4F2KWT
4G2F via 4F3XX
4K6OF via UA3FDX
4M4C via YV4GLD
4N1A via YU1FJK
4N600A via 4N1A
4N9Z via YU1BFG
4S7DRG via DK9DR
4W3CW via G3WQU
4X/G3WQU via G3WQU
4X1FQ via AA4V
4Z8AS via WB4FSV
5B/UA6LC via UA6LCW
5B4/GM4AFF via MØCMK
5B4/OL8R via OK1FCJ
5B4/RA3C via RA3AMG
5B4AHH via RA3AMG
5C8M via DJ9MH
5H3EE via DL4SM
5N6EAM/7 via IK2IQD
5V7AD via WG9J
5W1CW via ZL1AMO
5W1DL via K6DXX
5Z4IA via N3CLO
6D2YFM via W5NC
6P2ZA via VE3XAP
6W7RV via F4AHV
7Q7MT via NU5O
7S3J via SMØDZH
7S6A via SM6DOI
8Q7AV via DK6AV
8Q7BO via MØBOX
8R40USA via 8R1AK
8S6E via SM6FUD
8S6T via SM6WET
8S7VEN via SM6XMY
9A/NY6W via 9A6XX
9A/OK2EC via OK2EC
9A/OK2PBM via OK2PBM
9A0CI via HA3KNA
9A0CI/LH via DEØMST
9A0EU via 9A5CY
9H1RV via 9H1XE
9H3MM via DF4SA
9H3RH via OE1ZKC
9J2HK via JP1RZS
9K2/MØAYL via G4OHX
9M2TK via JA7IV
9Y4/AJ9C via AJ9C
9Y4/KE9I via KE9I
9Y4/N9LAH via N9LAH
A22AA via KY4P
A25/KY4P via KY4P
A35EA via ZL1AMO
A35ZF via DK2ZF
A41MO via A47RS
A71EM via EA7FTR
AA6TT/PJ2 via NT1Y
AA6TT/V2 via NT1Y
AB5EB/VO2 via N6AWD
AD5A/VO2 via N6AWD
AM2PI via EA2PI
AM4UCM via EA4GU
AN3KU via EA3KU
AN6UN via EC6TK
AN7AAW via EA7AAW
AN7WA via EA7WA
AP2ZA via VE3XAP
AYØF via LU1FKR
BNØW via BV2KI
BNØW via BV2KI
BOØK via BV2KI
BOØKS via BV2KI
BOØM via BV2KI
BV2B via BV2KI
BV2B/9 via BV2KI
BV2YA via BV2KI
BV2YA/1 via BV2KI
BV9A via BV2KI
BV9AAA via BV2KI
BV9AAC via BV2KI
BV9AYA via BV2KI
BWØCW via BV2KI
BWØHCS via BV2KI
BWØN via BV2KI
BWØPSK via BV2KI
BWØRTY via BV2KI
BWØS via BV2KI
BWØSSB via BV2KI
BW2/KI8AF via KI8AF

(The table of QSL Managers is courtesy of John Shelton, K1XN, editor of "The Go List," 106 Dogwood Dr., Paris, TN 38242; phone 731-641-4354; e-mail: <golist@golist.net>.)

David, GØDHM, likes DXing, but also enjoys his horses. David is shown here with Edna, a rare breed known as a Suffolk. David like to operate 15 meters SSB with his FT-101ZD, FL-2100, and Hy-Gain EX-14. (Photo courtesy of KDØJL)

For routine logging here are the top ten methods in order of preference: DX4WIN, DXBase, paper (not software), N3FJP, Logic, Logger, Prolog, Win-EQF, DXtreme, and WJ2O.

For contesting, the following: WriteLog, CT, TR, NA, N1MM, MMTTY, DXlab, RYLogit, WF1B, and RCKRTTY.

The biggest surprise to me was that paper ranked #3 for routine DX logging. A number of those responding commented that they use some computer program, but also keep a paper log of the "important" contacts. Obviously, they don't trust the computer. Having lost a few hard drives over the years, I can appreciate that sentiment and now use a ZIP disk backup for my own data files.

I hope you have been having a good summertime experience. With fall/winter conditions to look forward to, perhaps we'll see more activity on the bands.

Until next time, enjoy the chase and have fun! 73, Carl, N4AA

Win-EQF

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Log-EQF for DOS and 32-bit Win-EQF for Windows

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Contesting

BY JOHN DORR,* K1AR

Are Contesting and Ham Radio Mutually Exclusive?

September's Contest Tip

Operator fatigue is one of the toughest aspects of contesting. Here are a few techniques I've used over the years: Keep a few cool washcloths nearby to rub the sleep out of your eyes. Another one is to stand for a minute or two while operating. It may seem a little strange at first, but the idea of getting some body movement going without sacrificing operating time makes sense. Some operators even engage in limited stretching exercises and other physical movement. Of course, too, there is always your friend the window. Having the occasional cool breeze flow through the shack is a surefire way to deal with fatigue, even if conventional wisdom says it's too cold outside.

Calendar of Events

Aug. 28	Hawaii QSO Party
Aug. 28–29	YO DX Contest
Aug. 28–29	Ohio QSO Party
Aug. 29	SARL HF CW Contest
Sept. 4	Russian RTTY WW Contest
Sept. 4–5	All Asian SSB DX Contest
Sept. 8–10	YLRL Howdy Days
Sept. 11–12	WAE SSB DX Contest
Sept. 11–13	ARRL September VHF QSO Party
Sept. 12	North American CW Sprint
Sept. 12–13	Tennessee QSO Party
Sept. 18–19	Scandinavian CW Activity Contest
Sept. 18–19	South Carolina QSO Party
Sept. 18–19	Washington State Salmon Run
Sept. 18–19	QCWA QSO Party
Sept. 19	North American SSB Sprint
Sept. 24–27	Fall Classic Exchange
Sept. 25	Alabama QSO Party
Sept. 25–26	**CQ WW RTTY DX Contest**
Sept. 25–26	Scandinavian SSB Activity Contest
Sept. 25–26	Texas QSO Party
Sept. 25–27	Arkansas QSO Party
Oct. 2–3	Oceania SSB DX Contest
Oct. 2–3	California QSO Party
Oct. 9–10	Pennsylvania QSO Party
Oct. 16–17	Worked All Germany Contest
Oct. 30–31	**CQ WW DX SSB Contest**
Nov. 27–28	**CQ WW DX CW Contest**

At first glance, you are probably thinking that the title of this month's column is an odd question to ask. After all, what could be a better example of ham radio than the operating exploits of an active contester?

As it turns out, we hams tend to compartmentalize ourselves. Here are just a few examples:

- "I like to chase DX."
- "I won't be on this weekend. I'm not a contester."
- "I just don't understand what keeps the level of interest in operating so high for those VHFers."
- "I really don't operate much. I tend to be a homebrewer who likes to make things work."
- "As hams, we have an obligation to support public-service activities as a way of giving something back to the community."
- "I'm a phone guy."

The list can go on and on. In reality, one of the things that makes our hobby so great is that all of the above examples make sense. Every time I have the opportunity to explain ham radio to a non-ham, the conversation inevitably centers on the hobby's diversity. Whether we like to tackle complex technical challenges or talk to someone across the world, there is something for everyone. That's why the hobby has such staying power for most of us, some who have been in the game for over 70 years!

Now, however, back to the original question. Over the years, contesting has had a love-hate relationship among those in the hobby. For some, contesters are viewed as representative of the cream of the crop of ham operators. In addition, the technical contribution from contesters, as well as the existence of a loud voice to the ham radio industry, has resulted in tremendous progress in products and overall innovation. In sharp contrast, others view contesters as self-centered hams whose on-the-air practices offer little regard for anyone not participating in the contests. We often are thought of as the "bullies" of the band, providing little value other than the senseless exchange of numbers and letters, while simultaneously tearing up the bands during precious weekend time slots.

The reality is that most people view the world through their own unique pair of glasses. What provides a thrilling experience for some is nonsense to others. Like it or not, both sides of the aisle make very good points in this debate.

The fact of the matter is that the bad operating practices exhibited by some in our hobby are not limited to the contesting community. Other examples include:

- The DXer who calls someone while operating split with little regard to who might be using his transmit frequency.
- The SSTV operator who fires up on top of someone, using the excuse that the other station is operating in the "SSTV window."
- The net control who starts up his net on a specific frequency, ignoring its current use as if the frequency was allocated to him directly from the FCC for exclusive use.
- The VHF operator who uses agreed-upon "DX" calling frequencies to talk to a friend across town.
- The 160-meter operator who ignores the DX window established by gentlemen's agreement.

As you can see, there's plenty of culpability to pass around if we want to assign blame for on-the-air operating sins.

As unacceptable as it is for a rabid contester to push aside a small station on the band in the heat of battle, in contrast it is important to also note that there are those who use their stations and skills to pass important on-the-air health and welfare information to those in need of our help.

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e-mail: <K1AR@contesting.com>

The bottom line is that while contesters (and others) need to be vigilant in their respect for others on the bands, they are indeed key members of the fabric of ham radio. While many of you may not see the value in their mission, the fact remains that they have been, and continue to be, a significant contributor to the hobby we all enjoy—ham radio.

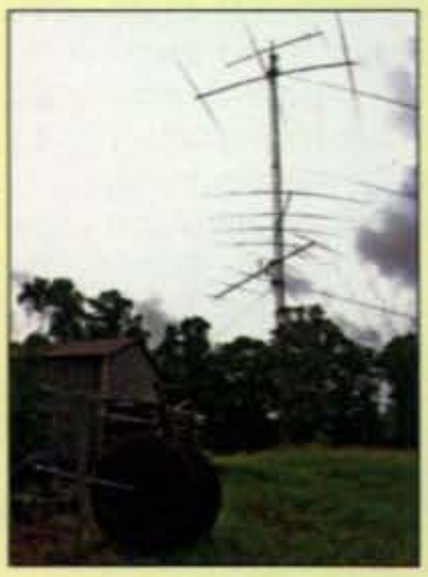
Final Comments

Well, that's all the time and space I have available for this month's column. As a reminder, take a few minutes and complete your 2004 CQ Contest Survey. You can find a copy in the August issue of CQ or on-line at <http://hamgallery.com/survey/>. Be sure that you're one of this year's participants and make your thoughts and opinions known!

73, John, K1AR

On the Cover:

Bill Fisher, W4AN (SK)



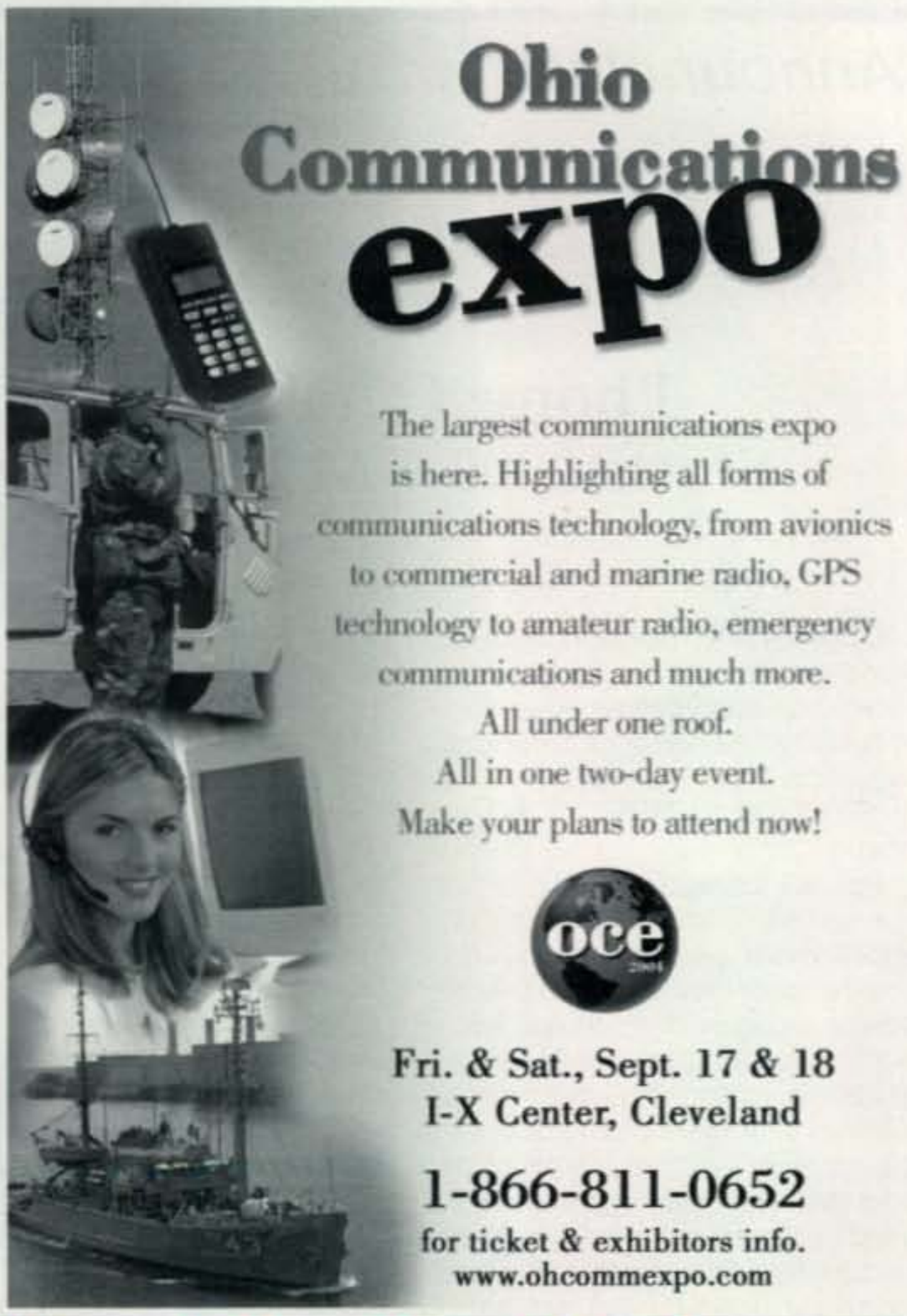
Many of you may recall the tragic death of one of ham radio's great contributors a few months ago, Bill Fisher, W4AN. This month we're proud to share a part of the energy and enthusiasm Bill had for our great hobby, as can be seen by the impressive 40-meter Yagi atop of one of his towers at his mountain-top contest QTH in Dahlonega, Georgia. Much has been written about Bill in recent months—his contributions via contesting.com and eham.com (both of which continue to thrive after his passing), his operating excellence, and his desire to always give something back to ham radio.

Bill had many friends in the hobby, and I'm proud to say that I was one of them. In the sport of contest operating, our competitive nature brings a peculiar element to our relationships. Bill and I would often talk on the phone about our careers, family, and other matters, but more often than not, we would engage in a not-so-subtle series of head games with one another, especially as the time for "battle" approached.

As it turns out, one of Bill's favorite contests was the CQ WW DX CW, covered in this month's issue. One of the great shoot-outs in the CQ WW actually took place between Bill and me in the 1999 CW contest. As the contest timeframe approached, Bill was quietly focusing on one goal—winning the contest. While I certainly took Bill seriously, I had the advantage of operating from premier New England superstation K1EA. In my mind, there simply was no way that a station in Georgia could ever overcome that challenge. However, challenges such as that were exactly what motivated Bill. On that memorable weekend in November 1999, Bill delivered one of the contest's greatest performances as he demonstrated to all of us how hard work, desire, and discipline, when combined with skill, can allow one to reach one's goals. Yes, Bill "cleaned my clock" that weekend. It was not only impressive on its own merit, but the fact that it was such a conscious and deliberate effort makes it one of the great victories in the history of the CQ WW. Rarely before had a station that far away from the dominant Northeast racked up such an impressive victory (nearly 4300 QSOs and 9 million points). All I could do was scratch my head, tip my hat to Bill, and stand in awe.

A few months later at the Dayton Contest Forum, Bill and I had the opportunity to break down the results in a little more detail for those who were interested.While he clearly had won the operating battle, the reality for Bill was that that particular contest had actually started years earlier when he set out to build a world-class station up on the mountain with his own two hands and bring it to victory as he did in 1999. That's the person who is on this month's cover—a competitor, a gentleman, and a friend. We'll miss you, Bill, more than you could ever know! —*John, K1AR*

(Photo by Larry Mulvehill, WB2ZPI)



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Phone: October 31–31 CW: November 27–28
Starts 0000 GMT Saturday Ends 2400 GMT Sunday

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II. BANDS: All bands, 1.8 through 28 MHz, except for WARC bands.

III. TYPE OF COMPETITION (choose only one):

For all categories: All entrants must operate within the limits of their chosen category when performing any activity that could impact their submitted score. *All high power categories must not exceed 1500 watts total output power on any band.* Transmitters and receivers must be located within a 500 meter diameter circle or within the property limits of the station licensee's address, whichever is greater. All antennas used by the entrant must be physically connected by wires to the transmitters and receivers used by the entrant. Only the entrant's callsign can be used to aid the entrant's score. A different callsign must be used for each CQ WW entry.

A. Single Operator Categories: Single band or all band; only one signal allowed at any one time; the operator may change bands at any time.

1. Single Operator High: Those stations at which one person performs all of the operating, logging, and spotting functions. The use of DX alerting assistance of any kind places the station in the Single Operator Assisted category.

2. Single Operator Low: Same as III A 1 except that the output power shall not exceed 100 watts (see rule XI.11).

3. QRPp: Same as III A 1, except that the power output must not exceed 5 watts (see rule XI.11).

B. Single Operator with DX Spotting Net: Same as III A 1 except the passive (self-spotting not allowed) use of DX spotting nets is allowed.

C. Multi-Operator (all band operation only):

1. Single Transmitter (*MS*): Only one transmitter and one band permitted during any 10-minute period, defined as starting with the first logged QSO on a band. Exception: One—and only one—other band may be used during any 10-minute period if—and only if—the station worked is a new multiplier. Logs found in violation of the 10-minute rule will automatically be reclassified as multi-multi.

2. Two Transmitter (*M2*): A maximum of two transmitted signals at any time on different bands. Both transmitters may work any and all stations. A station may only be worked once per band regardless of which transmitter is used. Each of the two transmitters used must keep a separate chronological log for the entire contest period, or if electronic logging is used, the electronic log submittal (Cabrillo) must indicate which transmitter made each QSO. Each transmitter may make a maximum of 8 band changes in any clock hour (00 through 59 minutes).

3. Multi-Transmitter (*MM*): No limit to transmitters, but only one signal and running station allowed per band.

D. Team Contesting: A team consists of any five radio amateurs operating in the single operator category. A person may be on only one team per mode. Competing on a team will not prevent any team member from submitting his/her personal score for a radio club. A team score will be the sum of all the team member scores. SSB and CW teams are totally separate. That is, a member of an SSB team may be on a totally different CW team. A list of a team's members must be received at CQ Headquarters by the time the contest begins. Mail or fax the list to CQ, Att: Team Contest, 25 Newbridge Road, Hicksville, NY 11801 U.S.A.; fax 516-681-2926. Awards will be given to the top teams on each mode.

IV. NUMBER EXCHANGE: Phone: RS report plus zone (i.e., 5705). CW: RST report plus zone (i.e., 57905).

V. MULTIPLIER: Two types of multiplier will be used.

1. A multiplier of one (1) for each different zone contacted on each band.

2. A multiplier of one (1) for each different country contacted on each band.

Stations are permitted to contact their own country and zone for multiplier credit. The CQ Zone Map, DXCC country list, WAE country list, and WAC boundaries are standards. Maritime mobile stations count only for a zone multiplier.

VI. POINTS:

1. Contacts between stations on different continents are worth three (3) points.

2. Contacts between stations on the same continent but different countries, one (1) point. *Exception:* For North American stations *only*, contacts between stations within the North American boundaries count two (2) points.

3. Contacts between stations in the same country are permitted for zone or country multiplier credit but have zero (0) point value.

VII. SCORING: All stations: the final score is the result of the total QSO points multiplied by the sum of your zone and country multipliers.

Example: 1000 QSO points × 100 multiplier (30 Zones + 70 Countries) = 100,000 (final score).

VIII. AWARDS: First-place certificates will be awarded in each category listed under Sec.III in every participating country and in each call area of the United States, Canada, European Russia, Spain, and Japan.

All scores will be published. To be eligible for an award, a Single Operator station must show a minimum of 12 hours of operation. Multi-operator stations must operate a minimum of 24 hours. A single-band log is eligible for a single-band award only. If a log contains more than one band it will be judged as an all-band entry, unless specified otherwise.

In countries or sections where the returns justify, 2nd and 3rd place awards will be made.

All certificates/plaques will be issued to the licensee of the station used.

IX. TROPHIES AND PLAQUES:

Plaques and trophies are awarded for top performance in a number of categories. They are sponsored by individuals and organizations. For a current list of plaques and sponsors, or to learn how to become a sponsor, see the CQ website: <http://www.cq-amateur-radio.com/cqwwhome.html>. A station winning a World trophy will not be considered for a sub-area award; the trophy will be awarded to the runner-up in that area.

X. CLUB COMPETITION:

1. The club must be a local group and not a national organization.

2. Participation is limited to members operating within a local geographic area defined as within a 275 km radius from center of club area (except for DXpeditions specially organized for operation in the contest; club contributions of DXpedition scores are percentaged to the number of club members on the DXpedition).

3. To be listed, a minimum of 3 logs must be received from a club, and an officer of the club must submit a list of participating members and their scores, both on phone and CW.

XI. LOG INSTRUCTIONS:

1. All times must be in GMT.

2. All sent and received exchanges are to be logged.

3. Indicate zone and country multiplier only the FIRST TIME it is worked on each band.

4. Logs must be checked for duplicate contacts, correct QSO points, and multipliers.

5. *We want your electronic log. The Committee* ***requires*** *an electronic log for any possible high-scoring log.*

E-MAIL Required Content: *Please submit your log in the Cabrillo file format created by all major logging programs.* Be sure to put the STATION CALLSIGN and the MODE in the "Subject:" line of each message. Your software may automatically encode your log as an attachment. Your e-mail log will automatically be acknowledged by the server. You will also receive a personal access code from the server. Use this code to view your log for completeness and later to retrieve your computer analysis. Submit your CQ WW SSB log to **<ssb@cqww.com>** and your CQ WW CW log to **<cw@cqww.com>**.

DISKS: Please send your IBM, MS-DOS compatible computer disk. A disk containing your Cabrillo file may be submitted in lieu of a paper log. Label your disk clearly with YOUR CALL, files included, the mode (SSB or CW), and your category. Name your disk file correctly (for example, HSØAC.log).

6. For paper logs, use a separate sheet for each band.

7. Each paper log entry *must* be accompanied by a summary sheet showing all scoring information, category of competition, and contestant's name and address in BLOCK LETTERS. Electronic submission implies a signed declaration that all contest rules and regulations for amateur radio in the country of operation have been observed.

8. Sample log and summary sheets and zone maps are available from *CQ*. A large, self-addressed envelope with sufficient postage or IRCs must accompany your request. If official forms are not available, make up your own, 80 contacts to the page on $8\frac{1}{2}$" × 11" paper.

9. All paper log entrants are required to submit cross-check sheets (an alphabetical list of calls worked) for each band on which 200 or more QSOs were made.

10. Bad QSO penalty: three (3) additional contacts removed.

11. QRPp and Low Power stations must indicate their category on their summary sheets and state the actual maximum power output used, with a signed declaration.

XII. DISQUALIFICATION: Violation of amateur radio regulations in the country of the contestant, or the rules of the contest; unsportsmanlike conduct; taking credit for excessive unverifiable QSOs or unverifiable multipliers will be deemed sufficient cause for disqualification. Incorrectly logged calls will be counted as unverifiable contacts.

An entrant whose log is deemed by the Contest Committee to contain a large number of discrepancies may be disqualified from eligibility for an award, both as a participant operator or station, for one year. If an operator is disqualified a second time within five years, he/she will be ineligible for any *CQ* contest awards for three years.

The use by an entrant of any non-amateur means such as telephones, telegrams, internet, or the use of packet to SOLICIT contacts during the contest is unsportsmanlike and the entry is subject to disqualification. Action and decisions of the CQ WW Contest Committee are official and final.

XIII. DEADLINE:

1. All entries must be postmarked NO LATER than December 1, 2004 for the SSB section and January 15, 2005 for the CW section. **Indicate SSB or CW on the envelope, disk, or e-mail.**

2. An extension of up to one month may be given if requested by letter or other means. The granted extension must be confirmed by letter sent to the attention of the Contest Director, must state a legitimate reason, and the request must be received before the log mailing deadline. Logs postmarked after the extension deadline may be listed in the results but will be declared ineligible for an award.

Both Phone and CW mailed logs should be sent to CQ Magazine, 25 Newbridge Road, Hicksville, NY 11801.

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awards

BY TED MELINOSKY,* K1BV

Applying for USA-CA All Counties

The finish line is in sight. You're only a few counties away from working your last county for USA-CA, and it's about time to think of applying for the USA-CA Award. For about half of you, this will be your first and only application for USA-CA. You've heard that some evidence will be required of you. Also, what about the plaque? Will K1BV accept that grimy and tattered green or red booklet? How about your EXCEL spreadsheet? All kinds of questions come up at this time.

Most applicants write or e-mail me in advance asking these and many other questions. As a result, I've developed a check list that covers everything you need to know about applying. Here's what you will receive in reply:

My sincere congratulations. (I never get tired of this, and it comes from the heart!) You are required to provide the following:

1. The CQ USA-CA county booklet or printout of counties confirmed (printouts must contain same data as in booklet).
2. Certification statements, either from the booklet or equivalent, signed by you and witnesses.
3. Indicate any special endorsements you may have earned (All CW, All 20M SSB, etc.).
4. Award fee of $12 if you're not a subscriber, and $6 for *CQ* subscribers. (If you are a subscriber, be sure to enclose a recent *CQ* mailing label.) If you already have the certificate, the endorsement fee is only $1.25 regardless of the number of seals or endorsements.
5. Make checks payable to: USA-CA Custodian.
6. Enclose the following QSLs or MRCs (Mobile Reply Cards) with your application. (I will provide you with a short list of the ones I want you to submit.)
7. An SASE for safe return of the above cards.
8. The cost of the optional plaque is only $44. I will have it drop-shipped from the engraving company in Michigan.
9. Indicate if you have already earned any lower levels of the award or if this is an entirely new award.
10. Please consider sending a 600-800 word biographical sketch of your ham/county hunting experience. It can be sent later, of course, as well. Your friends would like to know about you via my *CQ* column. A photo is great, but optional.

Robert Beatty, W4VQ
USA-CA All Counties #1094

I began my ham career in Charlotte, North Carolina in 1956 as Novice KN4IEX and passed the General exam a year later. The CW activity required of Novices in those days set the path for my later years. I relocated to the Orlando, Florida area in 1966, and I got the W4VQ call when vanity calls were allowed to be selected in 1976. Although it was not on my short list of choices, it has worked out well.

I enjoy participating in programs with measurable goals, so when CQ first introduced the USA-CA program, I hopped to it and started working every county I could find. In those days, there was only a 40-meter SSB net, which limited the coverage due to daytime propagation. I was able to borrow an SSB radio to participate on the net, and I eventually got award number 266 in 1963 for 500 counties. However, school, job, etc., slowed down the county hunting, and I did not get back into it seriously until one night in 1992 when on 20 CW I ran across W4HAS, who was mobiling back from a business trip. Jim was in northeast North Carolina, my home state, and I rode with him through several counties I had never worked. That fired up my interest again, and since I do not work SSB any more, the chase was back on to work all the new counties on CW. Because of the smaller number of individuals working mobile CW and because I was still working, it took longer to complete working all counties. I am convinced anyone can do it on SSB in relatively little time, but the challenge is greater for CW. I still have my original Record Book from CQ, although it is somewhat tattered. It was kept up to date during the quest, including all the SSB/AM contacts that had to replaced with CW QSOs.

It is not possible to recognize all the stations that helped me achieve this goal. To do so would invari-

*12 Wells Woods Rd., Columbia, CT 06237
e-mail: <k1bv@cq-amateur-radio.com>

USA-CA Special Honor Roll

Robert R. Beatty, W4VQ
USA-CA All Counties #1094 (All CW)
June 5, 2004

Robert T. Wood, N2KX
USA-CA All Counties #1095
June 17, 2004

USA-CA Honor Roll

500
ON6NR.....3303
EW2AA.....3304
JT1CO.....3305

1000
W4VQ.....1661
JT1CO.....1662

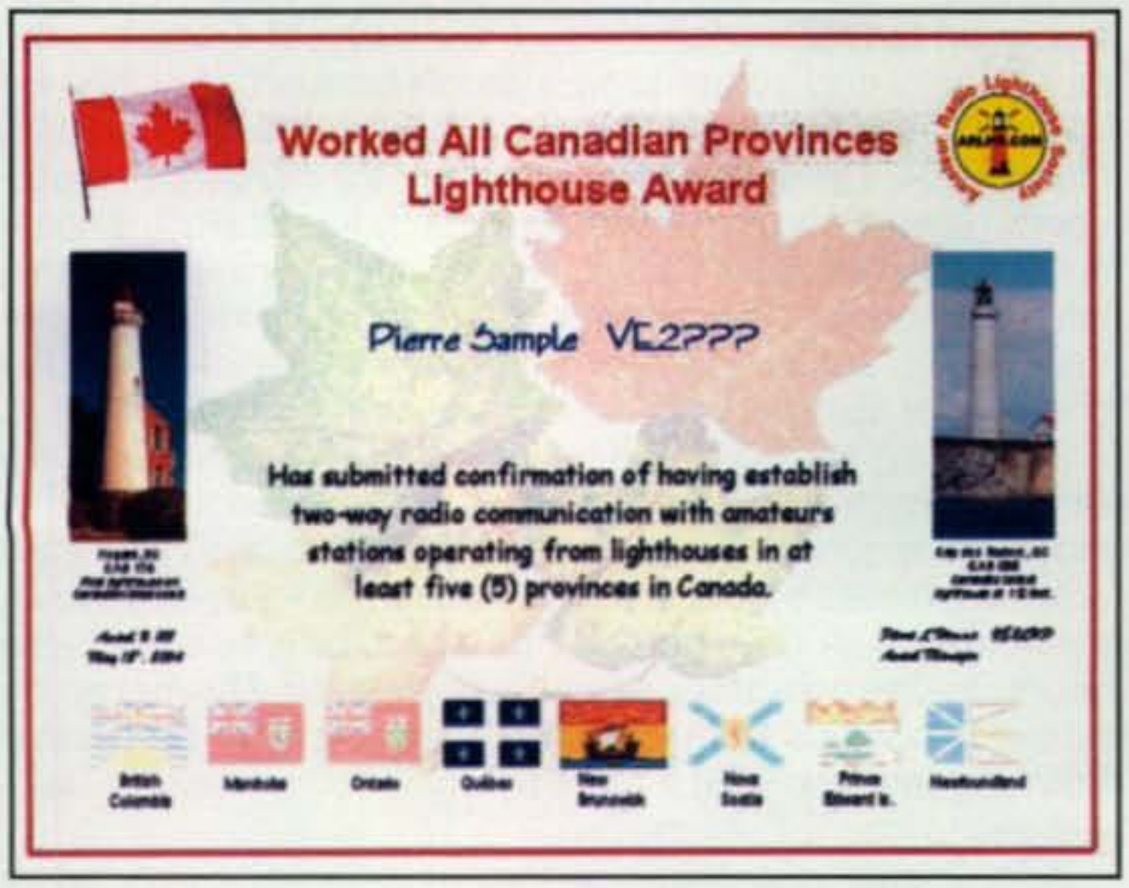
1500
W4VQ.....1390

2000
W4VQ.....1287

2500
W4OV.....1206

3000
W4VQ.....1116
N2KX.....1117

The total number of counties for credit for the United States of America Counties Award is 3077. The basic award fee for subscribers is $6.00. For nonsubscribers it is $12.00. To qualify for the special subscriber rate, please send a recent CQ mailing label with your application. Initial application may be submitted in the USA-CA Record Book, which may be obtained from CQ Magazine, 25 Newbridge Road, Hicksville, NY 11801 USA for $2.50, or by a PC-printed computer listing which is in alphabetical order by state and county within the state. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated June 1, 2000. A complete copy of the rules may be obtained by sending an SASE to Ted Melinosky, K1BV, 12 Wells Woods Road, Columbia, CT 06237 USA. DX stations must include extra postage for airmail reply.



Work lighthouse stations in at least five of the eight Canadian provinces that have lighthouses to earn the Worked All Canadian Provinces Lighthouse Award.

To earn the Province of Quebec Lighthouse Award work any five lighthouses in the province of Quebec.

ably omit mention of a worthy individual, so I'll just say, "Thanks to the CW stations that participated. You all are great!"

The number of mobile stations has increased significantly since I began county hunting, and I believe it is to these individuals that we owe the popularity of this aspect of the hobby. They are out in all sorts of conditions, some hazardous, at their expense all for the love of the hobby. We all should give the mobile stations a big "thank you" for their efforts.

My first love in ham radio is DXing, perhaps because my mentors in the early days were DXers. I have had good success with a modest (by today's standards) station. I am a member of the First Class CW Operators Club, a limited-membership group of CW aficionados based in the UK. I am at the top of the DXCC Honor Roll on mixed mode and missing one entity on CW and SSB (pretty good for someone who doesn't work SSB, eh?). I have 5 band WAZ on all CW and the CQ Millennium Award was won in about three months on CW only. My training in digging out weak signals helped me when some of

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the mobile stations were in less-than-desirable locations with less-than-desirable signals.

Will I try to work the counties again? Probably, but it will be on CW; I don't know phone. —*W4VQ*

DX Awards

Canadian Lighthouse Awards. The latest lighthouse-oriented award I've heard of comes from neighboring Canada and is sponsored by Pierre L'Homme, VE2HLP. There are two awards in the series. Both are handsome additions to the world of lighthouse awards now available.

General requirements: Awards are available to all amateurs and SWLs for working lighthouse stations as specified below. A station may be counted if it is located within visual sight of the lighthouse. It does *not* have to be physically located on the property of the lighthouse. To count as a Canadian lighthouse, stations may also be aboard vessels anchored in the vicinity of the lighthouse or lightship. All bands and modes okay. See <http://www.qsl.net/ ve2pt/> for official lists of valid Canadian lighthouses. Submit a copy of your log with call and location (name) of the lighthouse/lightship along with the date and time of QSO and the official ARLHS (Amateur Radio Lighthouse Society) number of the light. Fee for each award is $US5. Apply to: Pierre L'Homme, VE2HLP, 484 rue de la Garonne, St-Nicolas, QC, Canada G7A 1N8.

Worked All Canadian Provinces Lighthouse Award. Work lighthouse stations in at least five of the eight Canadian provinces that have lighthouses. An endorsement is awarded for working stations in all eight provinces.

Province of Quebec Lighthouse Award. Work any five lighthouses in the province of Quebec.

FYRSKIB XXI Diplom. Continuing the lighthouse theme this month is a very attractive award from Denmark. It allows you to use lighthouse or lightship contacts from all countries, although OZ7DAL is a required contact for the basic award level. In addition to the multicolored paper certificate, you will receive a lapel pin in the shape of a lighthouse.

Sponsored by OZ7DAL, the "Danish Amateur Lightship" located in the radio room of the *FYRSKIB XXI*. Contact amateur stations duly authorized to operate from active or inactive lighthouses or lightships anywhere in the world on or after 25 March 1994. The possibility of electronic interference may prevent amateur radio transmissions directly from the actual locations, since lighthouses and lightships often are used as transmission or relay points for many kinds of communications. For that reason, authorized operations from a location within the premises or up to 300–400 yards away are valid for the award.

SWL okay, and you need only send a list of stations heard. Direct contacts with minimum RS(T) of 33(8) on any band or mode are required. Cross-mode QSOs are okay. The award may be claimed by any callsign—individual, club, or special-event station. A QSL received by a club or special call also counts for the operator's personal application if his/her name or call is obvious from the QSL. Contacts may be worked from any location. QSLs must reflect QTH (photo QSL, official stamp on QSL, or similar).

A list showing the details of contacts should be certified by two officials of a radio club. If this is not possible, then the actual cards must be sent to the sponsor together with sufficient IRCs for their return. OX, OY, OZ stations apply direct to OZ7DAL with QSLs and sufficient postage for their return. The sponsor reserves the right to call for the applicant to submit any or all of the cards listed on the application. Awards can be claimed only if the contacts are made/ heard over a period of *more* than seven days. QSLs for contacts with OZ7DAL made on *any* 25 March will be considered a "Joker" and count for any otherwise required contact.

Award Requirements:

National—7 contacts anywhere in the world, OZ7DAL mandatory.

Upgrade endorsements:

Continental—additional 8 contacts, new total 15. Minimum 4 countries.

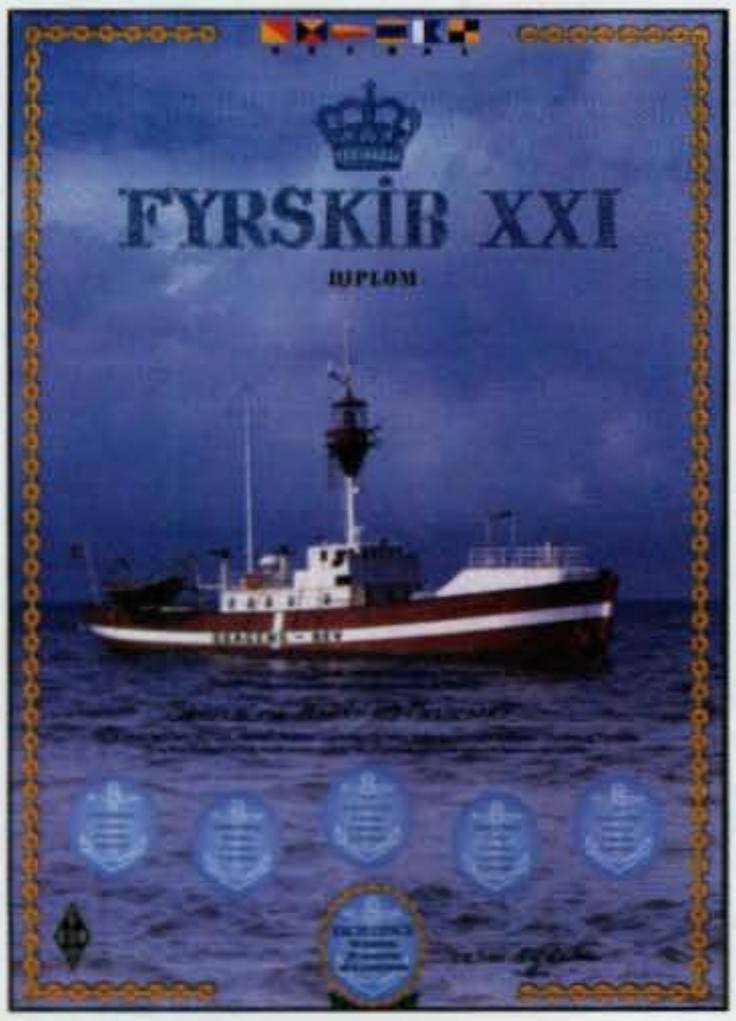
Bi-Continental—additional 5 contacts, new total 20. Minimum 6 countries in 2 continents.

Tri-Continental—additional 5 contacts, new total 25. Minimum 8 countries in three continents.

World Wide—additional 5 contacts, new total 30. Minimum 10 countries in 4 continents.

World Wide Extra—additional 5 contacts, new total 35. Minimum 15 countries in 5 continents.

Excellence—additional 15 contacts, new total 50. Minimum 20 countries in all 6 continents.



The FYRSKIB XXI award from Denmark and sponsored by OZ7DAL allows you to use lighthouse or lightship contacts from all countries.

The European Union SP Award is available for confirmed QSOs with all 25 European Union member states.

Sponsored by the CT RI Contest Group, work all five Rhode Island counties to receive the Worked All RI Counties Award.

Fee is 13 IRCs, $9.50US, or 11.50 Euros, or DKK60. For upgrades send SAE plus 3 IRCs, $US2, 2.50Euros, or DKK15 per upgrade. Apply to OZ7DAL, DK-8400 Ebeltoft, Denmark (e-mail: <oz7dal@qsl.net>).

European Union SP Award (EU-SP-A). The European Union (EU) is a voluntary group of democratic European countries committed to working together for social and economic purposes. It is not a state intended to replace existing states, but it is more than just another international organization. Its member states have set up common institutions to which they delegate some of their sovereignty so that decisions on specific matters of joint interest can be made democratically at a European level. The European Union increased its membership to a total of 25 countries this year. The new countries added to the union include Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, the Slovak Republic, and Slovenia. Bulgaria and Romania are expected to join by 2007. Poland's national organization, the PZK, is sponsoring this very colorful certificate for working each of those countries.

The award is available for confirmed QSOs after 1 January 2004 with all 25 European Union member states: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, The Netherlands, and the United Kingdom. During 2004, QSOs with Polish special-event stations with EU or UE in the suffix may be substituted for any missing country. Each such station may be substituted for only one country.

SWL okay. Cards are not needed. Send GCR list certified by a radio club or by two licensed amateurs. The fee is 5 Euros, $5US, or 5 of the new-style, large IRCs. Send applications to: Awards Manager HQ PZK, Augustyn Wawrzynek, SP6BOW, P.O. Box 54, 85-613 Bydgoszcz 13, Poland.

Worked All RI Counties Award

This month's last award is a county award from Rhode Island, and the certificate features the Newport lighthouse. Contacts made from Rhode Island lighthouses can count for both county and lighthouse awards!

Sponsored by the CT RI Contest Group, work all five RI counties (Bristol, Kent, Newport, Providence, Washington) using any bands or modes (no use of repeaters). There is no time limit. RI applicants must make all contacts from one county. Send a GCR list (photocopies of front and back are accepted) along with fee of $7US to CT RI Awards Manager Matthew Atwood, WE1H, 68 Griswold Road, Grand Isle, VT 05458.

Does your club or special interest group sponsor an award? Send me samples or a link to the information, and I'll see about getting you the publicity that will encourage award hunters to apply. 73, Ted, K1BV

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BY JOE LYNCH,* N6CL

Spectacular Sporadic-*E* Opening

This past July, weak-signal operators in the central to eastern half of the U.S. and southern Canada experienced perhaps the most spectacular sporadic-*E* opening in decades. Some veteran weak-signal operators say that this one was the best ever. This extraordinary propagation, which occurred on July 6–7, 2004, included a short opening at around 1600 UTC, and a 5-plus-hour 2-meter opening between approximately 2100 and 0200 UTC. It also included approximately 30 minutes of propagation on 1.25 meters between approximately 2300 and 2330 UTC. As one would expect, propagation on 6 meters was intense both days. However, this report covers the propagation that occurred on 144 and 222 MHz during the respective openings.

To date, I have received more than 50 reports related to this opening. This is far in excess of reports received for any other single event in my more than a dozen years of reporting weak-signal activities in this column. There were way too many to include them all in one issue. Therefore, I am splitting the reports between this month and next month, so if you do not see your report here, look for it in next month's column. If you have not sent me a report, please do so as soon as possible. Thank you to those of you who did e-mail me in response to my request via the VHF reflector. I was able to produce a small summary in the summer issue of *CQ VHF* magazine, have expanded that summary here, and will conclude it in next month's column in *CQ*.

Those who have sent me reports of their activities include the following, with their respective grids: AA3ID, FM25; AF4HX, EM85; AF4OD, EM72; AK3E, FM19; KØAWU, EN37; K1TEO, FN31; K1TR, FN42; K2ERG, FN13; K2SMN, FN20; K3KEL, FN11; K4RTS, FM08; K5MQ, EM31; K5PJR, EM26; K5SW, EM25; K8MD, EN82; K9AKS, EN41; KE4YYD, EL79; KMØT, EN13; KT4JA, EL97; KY1K, FN54; NØGZ, EN31; N2SLN, FN22; NØLL, EM09; NØRQ, EM13; NØUK, EN34; N1BUG, FN55; N1RR, FN41; N4HN, EM95; N4ION, EM62; N4JQQ, EM55; N5TIF, EM12; N9LR, EN50; N9QQB, EN53; NW5E, EL98; VE3AX, FN02; N3LL (op. W3KWH), EN90; VE3TMG, EN82; WØFY, EM48; W1GHZ, FN42; W1LP, FN41; W2MPK, FN23; W4HP, EM75; W4VC, EM81,; W5SNX, EM73; W8PAT, EN81; W8WN, EM77; W9FS, EN61; WA1ECF, FN41; WA3LTB, EN92; WA5IYX, EL09; WA5JCI, EM21; WA8RJF, EN91; WB2SIH, FN31; WB4WXE, EM74; WD4KPD, FM15; and WZ1V, FN31.

Additional reports came from WA5IYX, EL09, who advised me that he was too far south of the opening, and NØIT, EM48, who said that in St. Louis he was one of 500,000 households with no electricity for two days. Also, noted for his absence was N1BUG, FN55, who was on the road between his QTH and New Hampshire, helping a family member who was moving. Your editor was in a similar predicament, on the road in Birmingham, Alabama, with XYL Carol, W6CL, at the American Council of the Blind national convention.

On 144 MHz the best DX reported was a contact between KY1K, FN54, and K5QE, EM31, which measures out to be 1604 miles. K5MQ, EM31, reported also working KY1K, FN54, for a distance of 1514 miles and his 46th state terrestrially. KY1K, in commenting on his station, stated that it is all the more remarkable that he was on the farthest DX end of so many QSOs, considering that he is only running 200 watts into a single 12-element Yagi only 21 feet high and surrounded by trees. In addition, his new mast-mounted preamp was still in the box! During the opening his wife, NK1I, had a run of her own, in which she worked 20 stations. KY1K wrote:

> Wow! What a new way to break in a new station! We had just set up the 2-meter station at our house; the station has been on the air for less than two months now.
>
> It started at 2103 UTC with KB4TCU, EM81, and ended 2 hours and 45 minutes later with W4VC, also EM81. We worked from Florida to Texas, but did not get up into Ø-land. I worked a neighbor in FN42 this morning; he did get into MO and OK though! Texas is a pretty good haul from here, probably only workable on EME or sporadic-*E*, so we were glad to work all those DX states. I worked a mobile station in GA as well as a neighbor who was roving in FN45 (a rare grid). He picked a great time to be on high ground with his well-equipped 2-meter station. I haven't even started to total up the states or grids, but worked 55 stations. The majority of them were very loud and reasonably easy to work. Here's the grid rundown: EL87, EL96, EL97, EL98, EM31, EM52, EM54, EM55, EM60, EM64, EM70, EM72, EM73, EM74, EM75, EM76, EM77, EM81, EM83, EM84, EM85, EM93, and EM96. More than a few operators said to me, "Thanks for Maine." This was my first major sporadic-*E* event on SSB, although I worked sporadic-*E* on 2-meter FM years ago (MA to TN, voice repeater in 1980 or so). It also was my wife's first ever!"

VHF Plus Calendar

Sept. 5	Poor EME conditions
Sept. 6	Last Quarter Moon
Sept. 8	Moon Apogee
Sept. 10–11	ARRL Sept. VHF QSO Party (See text for details)
Sept. 10–12	TAPR/ARRL Digital Communications Conference, Des Moines, Iowa (See text for details)
Sept. 12	Good EME conditions
Sept. 14	New Moon
Sept. 18–19	Second weekend of the ARRL 10 GHz Cumulative Contest (See text for details)
Sept. 19	Poor EME conditions
Sept. 20	144 MHz Fall Sprint (See text for details)
Sept. 21	First Quarter Moon
Sept. 22	Moon Perigee
Sept. 23	Autumnal Equinox
Sept. 26	Good EME conditions
Sept. 28	Full Moon. 222 MHz Fall Sprint (See text for details)

—EME conditions courtesy W5LUU

e-mail: <n6cl@sbcglobal.net>

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Speaking of husband-and-wife teams, NØRQ, EM13, reported that he and his wife, KC5POV, worked W1AIM, FN34, for a distance of 1510 miles. KØAWU reported his best DX to be NW5E, EL98, for a distance of 1440 miles. WA1ECF, FN41, reported making multiple QSOs in the 1000 to 1500 mile range. K1WHS, FN43, and K5SW worked again (having worked the first time in last September's huge tropo opening) for a distance of just under 1400 miles. W8WN relayed a report that WA5LFD, EM12, worked WB2BYP, FN13, and K2AXX, FN12, for a distance of 1256 miles, and that W5FRG, EM35, reported that locals were working in excess of 1400 miles. Also N4HN, EM95, and K2SMN, FN20, reported working VO1TJM, GN85, the day before. For N4HN, the QSO measured out to be 1427 miles. The next day N4HN worked 36 stations in 24 grids and seven new states, while K2SMN worked 24 stations in 20 grids.

Concerning the opening, W1GHZ wrote: "This was the best 2-meter *E*-skip I've heard. I knew that something was up when I heard QRM on the FM broadcast band on the way to work in the morning. I tuned around and heard a weather forecast for Alabama. On the way home the FM broadcast QRM was much worse, so I ran for the shack upon arrival. All in all, it was great fun. I had no idea that there were that many stations in Memphis!" Paul made contacts in 21 grids, including six in EM55.

From the car, N2SLN/M worked nine stations in eight grids and heard the following on the FM car radio dial: WOLL 94.3 MHz, Riviera Beach, FL (1118 miles); KXBL 99.5 MHz, Tulsa, OK (1167 miles); KSMB, 94.5 MHz, Lafayette, LA (1244 miles); and KKPT 94.1 MHz, Little Rock, AR (1049 miles).

From FN23, W2MPK wrote: "This was the best 2-meter *E*-skip I have had the pleasure of operating in my 47 years as a licensed ham. Could not believe it when I heard K5SW call me from Oklahoma, making my 38th state on 144 MHz and presently using only a 13-element Yagi at 30 feet and 80 watts. I worked the following grids: EL87, EL96, EL98, EM25, EM27, EM31, EM35, EM54, EM55, EM62, EM64, EM72, EM74 and EM81. I noticed that most contacts were made with the antenna pointed more west than south. Southern stations were definitely weaker when the antenna was pointed south."

From EN92, WA3LTB wrote: "I heard VE3AX, FN02, starting to work some stations in Florida and other southern grids but was not hearing any of the other stations for about an hour. Then I *finally* got into the action with signals all up and down the 2-meter band. From Florida to Texas and everywhere in between, it was great for about an hour until it dropped out and then came back in for a very short time. I worked the following grids from here: EL98, EL96, EM12, EM13, EM25, EM27, EM36, EM37, EM74, EM75, EM41, EM58, EM62, EM64, and EL59 all with my big 100 watts and single Yagi antenna."

From EM72, AF4OD wrote:

I've only been active on the VHF bands for a year now, and it was quite an event for me. Below are the grids and states I worked yesterday. I started as soon as I got home from work and the band was already wide open. Starting at 2148 UTC, I finished on 2 meters at 7/7/04 1558Z. I worked 74 two-meter stations with only two dupes. I also worked 80+ 6-meter stations, but their info is not listed. I worked mobile stations with vertical antennas, base stations with verticals, but mostly fixed stations. I worked 17 VEs, 13 from Ontario and four from Quebec.

I worked a total of 39 different grids and 15 different states. The states are VT, MA, NY, CT, NH, ME, MN, WI, MI, NE, PA, OH, IL, NJ, and RI. The grids are EN56, EN85, EN92, EN91, EN74, EN51, EN93, EN94, EN66, EN44, EN46, EN36, EN37, FN25, FN34, FN54, FN32, FN31, FN43, FN42, FN44, FN35, FN03, FN33, FN20, FN21, FN46, FN36, FN37, FN41, FN12, FN14, FN13, FN53, FN02, FN07, FN05, and FN30. All of these were new to me, because I hadn't been on the VHF bands very long. I had lots of QRM and QRN from big thunderstorms. The rig is a Yaesu FT-736 with a TE amp at 300+ watts and a Cushcraft 13B2 Yagi at 35 feet.

From FN31, WZ1V wrote:

It was a mind-boggling 144- and 222-MHz sporadic-*E* opening! I got on at 2103 UTC with KB4TCU, EM81, as the first 144-MHz QSO. Four hours and 45 minutes later we had worked 95 unique calls in 52 grids on 2-meter sporadic-*E* with the best DX WD5DJT, EM12, at 1448 miles (2331 km). On 222 MHz we worked 4/3 starting at 2252 UTC, with WØJRP EM27, AG4V EM55, KØJXI EM55, and ending at 2308 UTC with K5SW, EM25, at 1274 miles (2051 km). Before duping, we had well over 100 contacts on 2 meters alone. Special thanks to those who worked me twice! On 144 MHz, it was open here continuously for over 3.5 hrs with many sporadic-*E* contacts in the hour following, and 222 MHz was open continuously at least a half hour. Encore!

Grids worked include the following: EL79, EL87, EL96, EL97, EL98, EL99, EM12, EM15, EM16, EM17, EM25, EM26, EM27, EM29, EM31, EM35, EM37, EM38, EM41, EM45, EM46, EM48, EM50, EM51, EM52, EM54, EM55, EM56, EM57, EM58, EM60, EM62, EM63, EM64, EM66, EM68, EM70, EM72, EM73, EM74, EM75, EM76, EM77, EM79, EM81, EM82, EM83, EM84, EM85, EM93, EM95, and EN91.

From EL79, KE4YYD wrote: "Thunderstorms interfered with most of the opening. However, I was able to make 25 QSOs with 13 grids. Grids worked were FN 02, 03, 20, 30, 31, 32, 34, 35, 41, 42, 43, 44, and EN37."

From EN81, W8PAT wrote: "I wish I could report a string of grids worked, but I was just too close to the *E* cloud most of the time. I did have sporadic-*E* propagation on July 5 at 0153 UTC to EM15 and at 2127 UTC to FN84. I do have some observations. Based on reports, plotting the midpoints, the *E* cloud seemed to follow a path from over FM17, FM08, EM98, EM89, EM79, EM69, EM59, EN40, and EN30. I noticed I was hearing stations underneath the *E* cloud quite well via tropo. I also was hearing stations 100 to 300 miles north and east of me working sporadic-*E*. When the *E* cloud was on the east coast, I probably had sporadic-*E* propagation into the Bermuda triangle, but there was no one home, hi! Special congratulations to those of you who worked 222-MHz sporadic-*E*. I heard WA8RJF, VE3AX, and K2AXX to my northeast keeping 222.100 MHz busy."

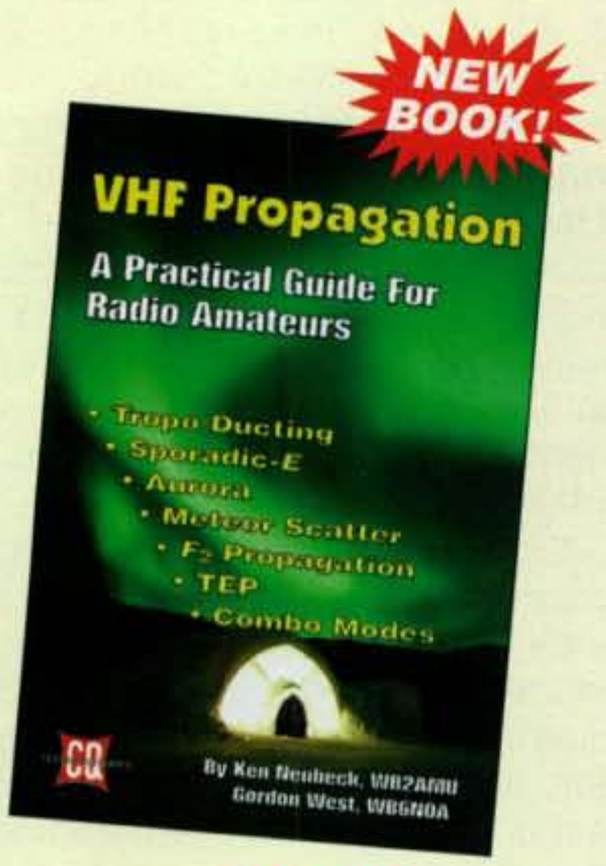
N1RR, in FN41, wrote: "This was my first 2-meter sporadic-*E* opening. I run 25 watts into a 16-element Yagi at 25 feet. I was delayed getting home from work, and I knew the band was open. Got on at about 2200 UTC. My first contact was with KD4ESV in EL87, followed by contacts in the following grids: EM27, EM37, EM45, EM55, EM56, EM59, EM59, EN50, EM68, EM72, EM79, and EM81. I heard K5SW and others until after 0100 UTC, but I was too weak and they had QSB." As the band closed, N1RR went to 6 meters, where he worked several more stations, thereby bringing his grid total to 100 on that band in the first three weeks that he has been on that band, and running only 20 watts!

KT4JA, in EL97, wrote: "I experienced an excellent 2-meter sporadic-*E* opening on July 6. I worked grids FN07, FN10, FN12, FN14, FN22, FN25, FN34, FN35, FN42, and EN93. My best DX was VE2HOG in FN07. W1AIM in FN34 was 60+ over S9. The QRM and QSB were deep at times. It sounded like a 20-meter pile-up. Conditions started at about 1600 UTC and were off and on throughout the day. The peak conditions here were at around 2200 to 2330 UTC, to stations in the northeast. The 2-meter propagation path started to shorten up, but I did not catch any 222-MHz sporadic-*E* activity here."

AK3E, in FM19, wrote: "I heard a lot more stations than I worked. I was running up and down the band looking for

VHF Propagation

A guide For Radio Amateurs



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new grids and/or states. Best 'DX' was NØKQY, DM98 (not new). Had a great time." In addition to DM98, AK3E worked 25 other stations in more than 15 other grids.

From EM37, K5PJR wrote: "Some opening! Let's do it again! I made 94 contacts in 20 grid squares."

K4RTS, in FM08, wrote: "Another very good day for 2-meter *E*-skip and my first 222-MHz *E*-skip QSO. I am enjoying this vacation. Signals were at times very strong; almost sounded like a contest it became so crowded on 2 meters. Many other stations heard but not worked. All told, five new grids on 144 MHz, and one new grid and state on 222 MHz."

Speaking of 222 MHz, AF4HX, EM85, reported working KMØT, EN13, and KØAWU, EN37. In turn, KMØT reported working NG4C, FM16, and also heard AA4H, EM86, and W4DEX, EM95. WD4KPD, FM15, reported working WØGHZ, EN34; NØKP, EN34; K3SIW, EN52; and K2DRH, EN41. K4RTS, FM08, reported his first sporadic-*E* QSO on 222 MHz with KBØPE, EM48. He also heard NØKQY, DM98, and NØLL, EM09. WA8RJF, EN91, reported working K5UGM, EM12, and K5SW, EM25. WZ1V, FN31, reported working WØJRP, EM27; AG4V, EM55; KØJXI, EM55; and K5SW, EM25, with the distance between K5SW and him measured to be 1274 miles. N9LR, EN50, reported that his first sporadic-*E* contact on 222 MHz was NG4C, FM16.

Also on 222 MHz, K1TEO, FN31, reported working WØJRP and NØLIE, both in EM27, but WØJRP is in Missouri and NØLIE is in Kansas, which made for two new states in one grid. He also worked K5SW, EM25, for a total of three states during his first 222-MHz sporadic-*E* opening. KØAWU reported working W4VC, EM81, and AF4HX, EM85, for his first ever QSOs on this band. VE3AX, FN02, reported working K5UGM, EM12, for his second sporadic-*E* contact on this band, the first one having taken place on July 8, 2001 with K5LLL, in EM10. He also reported hearing W2EV, FN03, work K5UGM just before he did. N3LL, while at the club station of W3KWH, EN90, worked WØJRP for their first 222-MHz QSO. NØLL, EM09, reported working W3OR, FM28, for his first 222-MHz sporadic-*E* QSO, in Delaware, no less. Moments later he made his second QSO by working KO4YC, FM17. K5SW, EM25, reported working WZ1V, FN31; K1TEO, FN31; WA8RJF, EN91; W2EV, FN03; and NQ2O, FN13. He also reported hearing N3LL, EN90; VE3AX, FN02; and K2AXX, FN12. W4VC, EM81, reported that his first sporadic-*E* contact on 222 MHz was KØAWU, EN37.

On the extremes, it seems that Minnesota was the farthest northwest. The husband-and-wife team of KY1K and NK1I, FN54, seems to have been the farthest northeast. In the southwest, central Texas was represented by several stations, but WA5IYX, EL09, stated that he was out of the propagation. In the southeast, Florida also was represented by many stations.

In commenting on what happened, Shelby Ennis, W8WN, stated to your editor that he still finds no evidence of double-hop sporadic-*E* and has not heard of any extra tropo in the northeast (even though he did not receive a lot of comments from that area). He comments further that to him it appears to be extra-long single hop or some cloud-to-cloud propagation. "Either one appears possible, as extensive as the coverage was and as strong as the ionization was!"

Finally, Shelby, who has been keeping track of these things, indicated that the July 6–7 opening was the fifth or sixth 2-meter sporadic-*E* opening for the month of July to that date. He goes on to say that he had a short opening on July 11, lasting only ten minutes. By contrast, during the same timeframe the Europeans already experienced 22 sporadic-*E* openings.

With the size of the opening, it will be some time before all of the data will be analyzed. Perhaps by the next column we will have some further information on this special day of propagation.

AO-51 Launched

The first of AMSAT-NA's newest version satellite, ECHO, was launched on June 29 from Baikonur, Kazakhstan. By now it should be fully operational. For current information on the satellite, go to: <http://www.amsat.org>. For an excellent writeup pertaining to the run up to the launch, see "From ECHO to OSCAR 51," by Lee McLamb, KU4OS, in the summer 2004 issue of *CQ VHF* magazine.

Great Plains Super Launch 2004

Also in the summer issue of *CQ VHF* there is a great article on this year's Great Plains Super Launch. This article, written by Zack Clobes, WØZC, covers the launch of several amateur-radio-equipped, helium-filled balloons by six different teams. My wife Carol and I had the privilege of being on the chase team for one of those balloons. We can attest to how much fun it was driving around

central Kansas while listening to the 2-meter beacon on board that particular balloon, and how much fun it was to watch someone else go into the bull pen (literally—read the article!) in order to retrieve the downed payload.

Current Contests

September: The **ARRL September VHF QSO Party** is September 11–12, 1800–0300 UTC. The second weekend of the **ARRL 10 GHz** contest is September 18–19. The **144 MHz Fall Sprint** is September 20, 7 PM to 11 PM local time. The **222 MHz Fall Sprint** is September 28, 7 PM to 11 PM local time.

For ARRL contest rules, see the issue of *QST* prior to the month of the contest or their URL: <http://www.arrl.org>. For Fall Sprint contest rules, see the Southeast VHF Society URL: <http://www.svhfs.org>.

Current Conventions and Conferences

September: The 2004 **TAPR/ARRL Digital Communications Conference** will be held September 10–12 at the Airport Holiday Inn in Des Moines, Iowa. For more information, go to: <http://www.tapr.org/dcc/>.

Call for Papers

Calls for papers are issued in advance of forthcoming conferences either for presenters to be speakers, or for papers to be published in the conferences' *Proceedings*, or both. For more information, questions about format, media, hardcopy, e-mail, etc., please contact the person listed with the announcement. To date this year the following conference organizer has announced a call for papers for its forthcoming conference:

Submit papers for the 2004 **Microwave Update Conference** by September 7 to: Kent Britain, WA5VJB, at <wa5vjb@cq-vhf.com>.

And Finally . . .

We have once again run out of space for our coverage of VHF activities. This is great, since it attests to the growing interest in our specialty frequencies of the hobby. Granted, a lot of space was and will be devoted to the sporadic-*E* opening that took place in July. However, there is much more going on that needs coverage. Thankfully, we have another vehicle for more extensive coverage, *CQ VHF* magazine.

Even there, however, we are finding more to cover than we have space for. This is a healthy sign for our hobby that needs to continue. It can do so with your increasing involvement, both by your own personal interest and via your recruiting others to join the fun. The Great Plains Super Launch mentioned above included the participation of many younger hams. It is not that we older hams are not up to chasing those balloons. Rather, it is that this type of activity is perhaps more appealing to younger hams instead of more sedentary types of activities, such as sitting at home and spinning the radio dial.

At the end of every sermon should be a good invitation and challenge. Here is my invitation and challenge for this "sermon": Let's keep on finding such activities and recruiting young people to be involved in them. In doing so, we will ensure the future of our hobby.

Until next month...

73 de Joe, N6CL

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propagation

BY TOMAS HOOD,* NW7US

Sporadic-*E* and Upcoming HF DX

A Quick Look at Current Cycle 23 Conditions
(Data is rounded to nearest whole number)

Sunspots
Observed Monthly, June 2004: 43
Twelve-month smoothed, December 2003: 55

10.7 cm Flux
Observed Monthly, June 2004: 100
Twelve-month smoothed, December 2003: 119

***Ap* Index**
Observed Monthly, June 2004: 9
Twelve-month smoothed, December 2003: 19

In the Spring 2004 Issue of *CQ VHF* magazine, I wrote, "I expect moderate to occasionally strong sporadic-*E* starting in May and peaking in July and August 2004." This prediction seems to have held up, based on some of the reports I have been reading. As of the time of my final writing of this month's column, some very strong *Es* events have occurred. July 6 and 7, 2004 was an exciting period of sporadic-*E* propagation, providing propagation up into 220 MHz (see this month's "VHF Plus" column). Many have reported that this particular event was the strongest since the 1960s. Certainly, with Asia, Europe, and North America all reporting record-breaking *Es* activity during this opening, it goes into the history books as the best in decades.

This is an exciting season for *Es*. Even during Field Day, *Es* played a more active role than during last year's Field Day. I tried my shot at working Field Day 2004 from Puget Island in the Columbia River, which runs along the border of Washington and Oregon. Conditions on the higher band were not very good with respect to *F*-layer propagation. However, there was a considerable amount of *Es* activity on the higher bands. Some of these openings were rather strong, though short, but allowed for a good run.

My prediction was for this year's *Es* to be livelier than last year's activity. I based this upon trends in global weather.

Scientists are still pursuing the multiple causes of sporadic-*E*. As far back as 1959 ten distinct types of sporadic-*E* and at least nine different theories of causation were offered. The classification of distinct types has been retained, but since the 1960s the wind-shear theory has become one of the most accepted theories.

Wind shear occurs when the wind blows in different directions and at different speeds as you go up in height. Simply, the wind-shear theory holds that gaseous ions in the *E*-layer are accumulated and concentrated into small, thin, patchy sheets by the combined actions of high-altitude winds and the Earth's magnetic field. The resulting clouds may attain the required ion density to serve as a reflecting medium for VHF radio waves. Although most research has confirmed a close association between wind shear and sporadic-*E*, not all aspects of the sporadic-*E* phenomenon can be explained, including its diurnal and seasonal variations.

If wind shear is one of the most pronounced causes of sporadic-*E*, what is the trend of our global weather patterns for 2004 in the Northern Hemisphere? Since warmer ocean waters cause less wind shear, we would have to watch the Pacific and Atlantic Ocean temperature trends from December 2003 through the summer.

The period between 1995 and 2003 has been the most active for Atlantic hurricanes in the historical record. Since 1995 seven of the nine hurricane seasons have been above normal (the exceptions being the El Niño years of 1997 and 2002). In the years when El Niño dominated, its presence suppressed hurricane activity in the Atlantic. The sporadic-*E* summer season of 2002 was intense. There seems to be a clear correlation between the increased wind shear (resulting in less hurricane and severe storm activity) and *Es* activity.

Early in 2004, weather experts predicted that this would be a year of slightly elevated hurricane and storm activity in the Atlantic region, but that neutral conditions would exist into the summer, in the El Niño Southern Oscillation (ENSO). The ENSO refers to the seesaw shift in surface air pressure at Darwin, Australia and the South Pacific Island of Tahiti. When the pressure is high at Darwin it is low at Tahiti and vice versa. El Niño and La Niña are the extreme phases of the southern oscillation, with El Niño referring to a warming of the eastern tropical Pacific and La Niña a cooling. If the El Niño

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LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for September 2004

	Expected Signal Quality			
Propagation Index.....	(4)	(3)	(2)	(1)
Above Normal: 1-2, 9-17, 24-29	A	A	B	C
High Normal: 3-5, 7-8, 18 20-23, 30	A	B	C	C-D
Low Normal: 6, 19	B	C-B	C-D	D-E
Below Normal: none	C	C-D	D-E	E
Disturbed: none	C-D	D	E	E

Where expected signal quality is:
A—Excellent opening, exceptionally strong, steady signals greater than S9.
B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.
C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.
D—Poor opening, with weak signals varying between S1 and S3, with considerable fading and noise.
E—No opening expected.

HOW TO USE THIS FORECAST

1. Find the *propagation index* associated with the particular path opening from the Propagation Charts appearing on the following pages.
2. With the *propagation index*, use the above table to find the expected signal quality associated with the path opening for any given day of the month. For example, an opening shown in the Propagation Charts with a *propagation index* of 3 will be excellent (A) on the 1st and 2nd, good (B) on the 3rd through the 5th, fair to good (C-B) on the 6th, etc.

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HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular meter band (10 through 160 meters), as shown in the left hand column of the chart. For the Alaska and Hawaii charts the predicted times of openings are found under the appropriate meter band column (10 through 80 meters) for a particular geographical region of the continental USA, as shown in the left hand column of the charts. An * indicates the best time to listen for 160 meter openings.

2. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. In the Short-Skip Chart, where two numerals are shown within a single set of parentheses, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of *days* during the month on which the opening is expected to take place, as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

3. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. On the Short-Skip Chart appropriate *daylight* time is used at the *path midpoint*. For example, on a circuit between Maine and Florida, the time shown would be EDT; on a circuit between N.Y. and Texas, the time at the midpoint would be CDT, etc. Times shown in the Hawaii chart are in HST. To convert to daylight time in other USA time zones, *add* 3 hours in the PDT zone; 4 hours in the MDT zone; 5 hours in CDT zone, and 6 hours in the EDT zone. *Add* 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 15 or 3 P.M. in Los Angeles; 18 or 6 P.M. in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *daylight* time in other areas of the USA, *subtract* 7 hours in the PDT zone; 6 hours in the MDT zone; 5 hours in the CDT zone and 4 hours in the EDT zone. For example, at 20 GMT it is 16 or 4 P.M. in N.Y.C.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts CW or 300 watts PEP on sideband; the Alaska and Hawaii charts are based upon a transmitter power of 250 watts CW or 1 KW PEP on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the *propagation index* will increase by one level; for each 10 dB loss, it will lower by one level.

5. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado, 80302.

HOW TO USE THE DX PROPAGATION CHARTS

1. Use chart appropriate to your transmitter location. The Eastern USA chart can be used in the 1, 2, 3, 4, 8, KP4, KG4, and KV4 areas in the USA and adjacent call areas in Canada; the Central USA chart in the 5, 9 and Ø areas: the Western USA chart in the 6 and 7 areas, and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 meters) for a particular DX region, as shown in the left-hand column of the charts. An * indicates the best time to listen for 160 meter openings.

3. The *propagation Index* is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of *days* during the month on which the opening is expected to take place as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this Propagation column for the actual *dates* on which an opening with specific propagation index is likely to occur, and the signal quality that can be expected.

4. Time shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M., 13 is 1 P.M., etc. Appropriate *daylight* time is used *not* GMT. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.

5. The charts are based upon a transmitter power of 250 watts CW, or 1 KW PEP on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the *propagation index* will increase by one level; for each 10 dB loss, it will lower by one level.

6. Propagation data, contained in the charts has been prepared from basic data published by the Institute For Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado, 80302.

influence is slight, there could well be an increase in hurricane conditions.

This in turn could bring about the wind-shearing conditions that could spawn sporadic-*E* conditions. As summer progresses, I am keeping my eye on the weather, and tracking our *Es* activity, to see if there is indeed any correlation between these weather patterns and *Es*.

Since there are so many more operators on the air for these *Es* openings, we have a great opportunity to discover more details about the mechanisms of sporadic-*E*. There are those who are now carefully watching the track of these *Es* openings to see if the strong Russian *Es* openings this summer precede the European *Es* openings, and if those precede the North American openings. If so, it might indicate that there is large movement of *Es* formations. Time will tell. I encourage more operators to become involved in spotting and reporting these *Es* events.

HF in September

With the 10.7-cm flux levels ranging from the 30's to over 100 this month, propagation on 10 through 20 meters will vary greatly. Some days conditions will be much as they were during the summer. Other days (and more often), conditions will be more like those experienced during the winter season.

The 10-meter DX season is starting to open up and by the end of September will open daily, especially between North and South America. Paths to Europe and the South Pacific as well as Asia are possible and will occur on days of High Normal and better conditions. However, we are now well into the decline of the current sunspot cycle, so these openings will be more rare than the last few years. Conditions may be marginal during the month, but the band is certainly coming alive. There will be less polar propagation as we move toward winter, though, making some parts of the world difficult over these paths. To catch the openings over high latitudes, get on the band shortly after sunrise, or watch for polar signals as the band closes for the evening. Twelve

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CQ Short-Skip Propagation Charts
September & October 2004
Local Daylight Savings Time
At Path Mid-Point

Meter Band		Distance Between Stations (Miles)		
	50-250	250-750	750-1300	1300-2300
10	Nil	10-21 (0-1)	08-10 (1) 10-15 (1-2) 15-22 (1)	08-10 (1-0) 10-14 (2-0) 14-18 (1) 18-22 (1-0)
15	Nil	08-10 (0-1) 10-14 (0-2) 14-22 (0-1)	08-10 (1) 10-14 (2) 14-17 (1-3) 17-18 (1-2) 18-22 (1) 22-00 (0-1)	08-10 (1) 10-14 (2) 14-17 (3) 17-18 (2-1) 18-20 (1) 20-00 (1-0)
20	12-20 (0-1)	08-10 (0-1) 10-12 (0-2) 12-15 (1-4) 15-17 (1-3) 17-20 (1-2) 20-07 (0-1)	08-10 (1-2) 10-12 (2-4) 12-15 (4) 15-17 (3-4) 17-19 (2-4) 19-20 (2-3) 20-21 (1-3) 21-23 (1-2) 23-08 (1)	08-09 (2-1) 09-10 (2) 10-14 (4-2) 14-16 (4-3) 16-19 (4) 19-21 (3) 21-23 (2) 23-01 (1) 01-06 (1-0) 06-08 (1)
40	08-10 (0-2) 10-12 (2-4) 12-16 (3-4) 16-18 (2-3) 18-20 (1-2) 20-22 (0-1)	08-10 (2-3) 10-12 (4-3) 12-16 (4-2) 16-18 (3) 18-20 (2-4) 20-22 (1-4) 22-00 (0-3) 00-03 (0-2) 03-06 (0-1) 06-08 (0-2)	08-10 (3-2) 10-12 (3-1) 12-16 (2-1) 16-18 (3-2) 18-20 (4-3) 20-22 (4) 22-00 (3-4) 00-03 (2-3) 03-06 (1-2) 06-08 (2-4)	08-10 (2-1) 10-16 (1-0) 16-18 (2-1) 18-20 (3-2) 20-21 (4-3) 21-00 (4) 00-03 (3-4) 03-06 (2-3) 06-08 (4-2)
80	07-09 (3-4) 09-12 (4) 12-19 (4-3) 19-22 (4) 22-04 (3-4) 04-07 (2-3)	07-09 (4-2) 09-12 (4-1) 12-17 (3-1) 17-19 (3-2) 19-21 (4-3) 21-04 (4) 04-06 (3-4) 06-07 (3)	07-09 (2-1) 09-17 (1-0) 17-19 (2-1) 19-21 (3-2) 21-22 (4-3) 22-04 (4) 04-06 (4-2) 06-07 (3-2)	07-09 (1) 09-17 (0) 17-19 (1) 19-21 (2) 21-22 (3-2) 22-04 (4-3) 04-06 (2) 06-07 (2-1)
160	17-19 (1-0) 19-21 (2-1) 21-06 (4) 06-08 (3-2) 08-10 (2-1) 10-12 (1-0)	18-20 (1-0) 20-21 (1) 21-03 (4-3) 03-06 (3-2) 06-08 (2-1) 08-10 (1-0)	20-21 (1-0) 21-23 (3-1) 23-03 (3) 03-06 (2-1) 06-08 (1)	21-23 (1-0) 23-03 (3-2) 03-06 (1) 06-08 (1-0)

ALASKA
September & October 2004
Openings Given in GMT

Reception Area	10 Meters	15 Meters	20 Meters	40/80* Meters
Eastern States	Nil	21-23 (1)	12-14 (1) 18-21 (1) 21-00 (2) 00-02 (1)	08-12 (1)
Central States	Nil	21-01 (1)	13-15 (1) 19-22 (1) 22-01 (2) 01-03 (1)	08-13 (1)
Western States	Nil	20-21 (1) 21-23 (2) 23-01 (1)	17-18 (1) 18-22 (2) 22-01 (3) 01-03 (2) 03-05 (1)	08-11 (1) 11-14 (2) 14-16 (1) 11-14 (1)*

HAWAII
September & October 2004
Openings Given In
Hawaiian Standard Time

Reception Area	10 Meters	15 Meters	20 Meters	40/80* Meters
Eastern States	Nil	07-12 (1) 12-15 (2) 15-16 (1)	11-13 (1) 13-14 (2) 14-16 (3) 16-17 (2) 17-19 (1) 03-05 (1) 05-07 (2) 07-08 (1)	17-19 (1) 19-21 (2) 21-00 (3) 00-02 (2) 02-03 (1) 19-20 (1)* 20-23 (2)* 23-01 (1)*
Central States	09-13 (1)	07-11 (1) 11-12 (2) 12-14 (3) 14-15 (2) 15-17 (1)	05-06 (1) 06-09 (2) 09-13 (1) 13-15 (2) 15-17 (4) 17-18 (2) 18-20 (1)	17-19 (1) 19-21 (2) 21-02 (3) 02-04 (2) 04-05 (1) 19-20 (1)* 20-00 (2)* 00-02 (1)*
Western States	10-15 (1)	07-10 (1) 10-12 (2) 12-15 (3) 15-16 (2) 16-18 (1)	06-07 (1) 07-10 (3) 10-12 (2) 12-14 (3) 14-16 (4) 16-18 (3) 18-19 (2) 19-21 (1)	17-18 (1) 18-19 (2) 19-01 (4) 01-03 (3) 03-06 (2) 06-07 (1) 19-20 (1)* 20-22 (2)* 22-03 (3)* 03-04 (2)* 04-06 (1)*

DX Charts
September 15–October 15, 2004
Time Zone: EDT
(24-Hour Time System)
EASTERN USA TO:

Reception Area	10 Meters	15 Meters	20 Meters	40/80* Meters
Western & Central Europe & North Africa	11-14 (1)	10-11 (1) 11-15 (2) 15-16 (1)	07-08 (1) 08-10 (3) 10-12 (2) 12-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	18-19 (1) 19-21 (2) 21-23 (3) 23-02 (4) 02-03 (3) 03-04 (2) 04-05 (1) 20-22 (1)* 22-01 (2)* 01-04 (1)*
Northern Europe & European CIS	10-12 (1)	10-13 (1)	07-08 (1) 08-10 (3) 10-12 (2) 12-14 (1) 14-16 (2) 16-18 (1)	18-20 (1) 20-04 (2) 04-05 (1) 21-04 (1)*
Eastern Mediter-ranean & Middle East	11-13 (1)	10-11 (1) 11-13 (2) 13-15 (1)	07-08 (1) 08-09 (2) 09-14 (1) 14-16 (2) 16-17 (3) 17-18 (2) 18-19 (1) 22-00 (1)	19-21 (1) 21-00 (2) 00-01 (1) 22-00 (1)*
Western Africa	14-16 (1)	09-11 (1) 11-13 (2) 13-16 (3) 16-17 (2) 17-18 (1)	08-10 (1) 13-15 (1) 15-16 (2) 16-17 (3) 17-18 (4) 18-20 (3) 20-21 (2) 21-23 (1)	20-23 (1) 23-02 (2) 02-04 (1) 01-03 (1)*
Eastern & Central Africa	13-15 (1)	11-13 (1) 13-15 (2) 15-16 (1)	13-15 (1) 15-17 (2) 17-18 (3) 18-19 (2) 19-21 (1)	21-02 (1)
Southern Africa	11-14 (1)	09-11 (1) 11-13 (2) 13-15 (3) 15-16 (2) 16-17 (1)	08-10 (1) 13-15 (1) 15-18 (2) 18-19 (3) 19-20 (2) 20-21 (1) 23-01 (1)	19-22 (1) 22-00 (2) 00-02 (1) 23-01 (1)*
Central & South Asia	Nil	09-11 (1) 18-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 19-22 (1)	05-07 (1) 20-23 (1)
Southeast Asia	Nil	10-12 (1) 14-16 (1) 18-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 16-18 (1) 20-22 (1)	06-08 (1)
Far East	Nil	09-11 (1) 18-20 (1)	08-09 (1) 09-10 (2) 10-12 (1) 17-19 (1) 19-21 (2) 21-23 (1)	06-08 (1)
South Pacific & New Zealand	15-18 (1)	11-15 (1) 15-17 (2) 17-18 (3) 18-19 (2) 19-20 (1)	07-08 (1) 08-11 (2) 11-14 (1) 16-20 (1) 20-00 (2) 00-04 (1)	01-02 (1) 02-03 (2) 03-06 (3) 06-09 (2) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Australasia	17-19 (1)	14-17 (1) 17-19 (2) 19-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 14-16 (1) 16-18 (2) 18-21 (1) 21-00 (2) 00-02 (1)	02-04 (1) 04-06 (2) 06-07 (3) 07-08 (2) 08-09 (1) 04-05 (1)* 05-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	11-14 (1) 14-17 (2) 17-18 (1)	09-10 (1) 10-13 (2) 13-15 (3) 15-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	07-08 (1) 08-09 (3) 09-10 (4) 10-15 (2) 15-17 (3) 17-19 (4) 19-21 (3) 21-22 (2) 22-00 (1)	19-20 (1) 20-21 (2) 21-04 (4) 04-06 (3) 06-07 (2) 07-08 (1) 21-23 (1)* 23-04 (2)* 04-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina and Uruguay	14-15 (1) 15-17 (2) 17-18 (1)	09-10 (1) 10-11 (2) 11-14 (1) 14-16 (2) 16-18 (3) 18-19 (1)	07-08 (1) 08-10 (2) 10-11 (1) 14-16 (1) 16-18 (2) 18-19 (3) 19-20 (4) 20-21 (3) 21-23 (2) 23-00 (1)	21-00 (1) 00-05 (2) 05-07 (1) 01-06 (1)*
McMurdo Sound, Antarctica	Nil	16-18 (1)	18-20 (1) 20-23 (2) 23-01 (1) 08-09 (1)	00-03 (1) 03-05 (2) 05-07 (1) 04-06 (1)*

Time Zones: CDT and MDT
(24-Hour Time System)
CENTRAL USA TO:

Reception Area	10 Meters	15 Meters	20 Meters	40/80* Meters
Western & Central Europe & North Africa	10-14 (1)	10-14 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	18-20 (1) 20-23 (2) 23-01 (3) 01-02 (2) 02-03 (1) 21-23 (1)* 23-01 (2)* 01-02 (1)*
Northern Europe & European CIS	Nil	10-13 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-15 (2) 15-17 (1) 21-23 (1)	20-23 (1) 23-01 (2) 01-02 (1) 22-01 (1)*
Eastern Mediter-ranean & Middle East	10-13 (1)	10-13 (1)	07-08 (1) 08-09 (2) 09-15 (1) 15-17 (2) 17-18 (1) 21-23 (1)	20-23 (1) 21-23 (1)*
Western Africa	12-14 (1)	09-11 (1) 11-13 (2) 13-15 (3) 15-16 (2) 16-17 (1)	07-09 (1) 13-15 (1) 15-16 (2) 16-19 (3) 19-20 (2) 20-22 (1)	20-23 (1) 23-01 (2) 01-02 (1) 23-01 (1)*
Eastern & Central Africa	Nil	12-16 (1)	07-09 (1) 13-16 (1) 16-19 (2) 19-20 (1)	21-00 (1)
Southern Africa	11-13 (1)	09-10 (1) 10-12 (2) 12-14 (3) 14-15 (2) 15-16 (1)	07-09 (1) 12-14 (1) 14-16 (2) 16-18 (3) 18-19 (2) 19-20 (1) 22-00 (1)	20-21 (1) 21-23 (2) 23-01 (1) 21-23 (1)*
Central & South Asia	Nil	18-21 (1)	07-08 (1) 08-10 (2) 10-12 (1) 18-21 (1)	06-08 (1) 19-21 (1)
Southeast Asia	Nil	17-19 (1)	07-08 (1) 08-10 (2) 10-13 (1) 18-22 (1)	05-08 (1)
Far East	Nil	15-17 (1) 17-19 (2) 19-20 (1)	07-08 (1) 08-10 (3) 10-11 (2) 11-13 (1) 17-19 (1) 19-22 (2) 22-00 (1)	03-05 (1) 05-07 (2) 07-09 (1) 06-08 (1)*
South Pacific & New Zealand	14-18 (1)	10-13 (1) 13-16 (2) 16-18 (3) 18-19 (2)	06-08 (1) 08-10 (3) 10-12 (2) 12-18 (1)	00-01 (1) 01-07 (3) 07-08 (2) 08-09 (1)

meters will experience much of the same conditions that exist on 10.

The 15-meter band will usually supply day-path propagation even over the polar paths, although these will become more rare than during peak cycle years. Watch 15 for many long-path opportunities. A considerable improvement is expected for DX propagation on both 15 and 17 meters, both opening shortly after sunrise and remaining open until after sundown. However, 15 will not stay open late into the night like it will during the spring season. Openings should be possible to all areas of the world, with conditions best toward Europe and the northeast before noon, and to the rest of the world during the afternoon hours. Openings toward the South Pacific, Australia, New Zealand, and the Far East should be possible well into the early evening, particularly when propagation conditions are High Normal or better.

Twenty meters will be the best daytime DX band this month. Look for 20 to open for DX at sunrise and remain open in all directions for a few hours. It should be possible to work into many areas of the world throughout the daylight hours, with a peak in the afternoon. Nighttime conditions will favor openings toward the south and to tropical areas, but some openings will also be possible to other areas, especially during High Normal or better days. Look for polar gray-line propagation into Asia. Long-path is common on 20 to southern Asia, the Middle East, and northeastern Africa, as well as the Indian Ocean region via the North Polar path.

Expect an improvement in nighttime DX conditions on 30 through 160 meters during September and October. This is due to the increasing hours of darkness and a seasonal decrease in the static level. Thirty and 40 meters should be best for worldwide DX from sunset to sunrise. Sixty meters should become more reliable for those farther contacts. Working all states on 60 is very possible during this season. Eighty and 160 meters will become hot bands during the hours of darkness, especially for an hour or so before local sunrise.

For short-skip propagation during September and early October, use 60 and 80 meters during the day for openings shorter than 250 miles, and either 80 or 160 at night. For distances between 250 and 750 miles try 30, 40, and possibly 60 meters during the day and 80 meters at night. For openings between 750 and 1300 miles 20 meters should work during the day, and 30, 40 and 60 from sundown to midnight, and 60 and 80 from midnight to sunrise. For openings greater than 1300 miles try 15, 17, or 20 meters during the day, and 30, 40, and even 60 during the hours of darkness. Check 10 and 12 meters for some fairly good openings beyond 1300 miles in the afternoon hours, especially with conditions are High Normal or better, and for paths into South America and the south Pacific.

		19-20 (1)	18-20 (2)	02-04 (1)*
			20-22 (3)	04-07 (2)*
			22-00 (2)	07-08 (1)*
			00-02 (1)	
Australasia	16-18 (1)	13-16 (1)	05-07 (1)	02-03 (1)
		16-19 (2)	07-08 (2)	03-05 (2)
		19-21 (1)	08-10 (3)	05-07 (3)
			10-13 (2)	07-08 (2)
			13-17 (1)	08-09 (1)
			17-18 (2)	05-06 (1)*
			18-20 (1)	06-07 (2)*
			20-23 (2)	07-08 (1)*
			23-01 (1)	
Caribbean, Central America & Northern Countries of South America	11-13 (1)	09-10 (1)	06-07 (1)	19-20 (1)
	13-16 (2)	10-11 (2)	07-08 (3)	20-21 (2)
	16-18 (1)	11-13 (3)	08-10 (4)	21-01 (3)
		13-16 (4)	10-12 (3)	01-05 (4)
		16-17 (3)	12-15 (2)	05-06 (3)
		17-18 (2)	15-17 (3)	06-07 (2)
		18-19 (1)	17-19 (4)	07-08 (1)
			19-21 (3)	20-23 (1)*
			21-22 (2)	23-05 (2)*
			22-00 (1)	05-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	14-15 (1)	09-10 (1)	07-08 (1)	21-00 (1)
	15-17 (2)	10-11 (2)	08-09 (2)	00-04 (2)
	17-18 (1)	11-13 (1)	09-11 (1)	04-06 (1)
		13-15 (2)	13-16 (1)	01-05 (1)*
		15-17 (3)	16-18 (2)	
		17-18 (2)	18-19 (3)	
		18-19 (1)	19-20 (4)	
			20-22 (3)	
			22-23 (2)	
			23-00 (1)	
McMurdo Sound, Antarctica	Nil	16-18 (1)	17-20 (1)	00-03 (1)
			20-23 (2)	03-05 (2)
			23-01 (1)	05-07 (1)
			08-10 (1)	04-06 (1)*

Time Zone: PDT (24-Hour Time System) WESTERN USA TO:

Reception Area	10 Meters	15 Meters	20 Meters	40/80* Meters
Western Europe & North Africa	Nil	10-12 (1)	07-08 (1)	20-21 (1)
			08-10 (2)	21-23 (2)
			10-13 (1)	23-00 (1)
			13-15 (2)	21-23 (1)*
			15-16 (1)	
			22-00 (1)	
Central & Northern Europe & European CIS	Nil	10-12 (1)	08-09 (1)	20-00 (1)
			09-10 (2)	
			10-12 (1)	
			12-14 (2)	
			14-16 (1)	
			22-00 (1)	
Eastern Mediterranean & Middle East	Nil	10-12 (1)	08-12 (1)	20-23 (1)
			12-14 (2)	
			14-16 (1)	
			20-22 (1)	
Western & Central Africa	12-14 (1)	10-13 (1)	07-08 (1)	21-00 (1)
		13-15 (2)	08-09 (2)	
		15-16 (1)	09-14 (1)	
			14-15 (2)	
			15-17 (3)	
			17-18 (2)	
			18-19 (1)	
Eastern Africa	Nil	13-15 (1)	07-09 (1)	20-22 (1)
			13-15 (1)	
			15-17 (2)	
			17-19 (1)	
			21-23 (1)	
Southern Africa	11-15 (1)	11-15 (1)	07-09 (1)	19-22 (1)
			12-14 (1)	
			14-18 (2)	
			18-19 (1)	
			22-00 (1)	
Central & South Asia	Nil	17-19 (1)	08-09 (1)	06-08 (1)
			09-11 (2)	19-21 (1)
			11-13 (1)	
			17-19 (1)	
			19-21 (2)	
			21-22 (1)	
Southeast Asia	Nil	16-19 (1)	07-08 (1)	01-03 (1)
			08-10 (3)	03-06 (2)
			10-11 (2)	06-08 (1)
			11-12 (1)	03-06 (1)*
			21-22 (1)	
			22-00 (2)	
			00-01 (1)	
Far East	16-19 (1)	14-16 (1)	07-08 (1)	01-03 (1)
		16-19 (2)	08-10 (3)	03-08 (2)
		19-20 (1)	10-13 (2)	08-09 (1)
			13-20 (1)	03-07 (1)*
			20-21 (2)	
			21-22 (3)	
			22-23 (2)	
			23-01 (1)	
South Pacific & New Zealand	13-15 (1)	11-15 (1)	14-18 (2)	21-22 (1)
	15-17 (2)	15-17 (2)	18-20 (3)	22-23 (2)
	17-18 (1)	17-19 (3)	20-22 (4)	23-00 (3)
		19-20 (2)	22-23 (3)	00-05 (4)
		20-21 (1)	23-01 (2)	05-07 (3)
			01-07 (1)	07-08 (2)
			07-08 (2)	08-09 (1)
			08-10 (3)	23-02 (1)*
			10-11 (2)	02-06 (2)*
			11-14 (1)	06-07 (1)*
Australasia	15-17 (1)	13-16 (1)	17-19 (1)	01-02 (1)
		16-17 (2)	19-20 (2)	02-03 (2)
		17-19 (3)	20-00 (3)	03-06 (3)
		19-20 (2)	00-03 (2)	06-08 (2)
		20-21 (1)	03-07 (1)	08-09 (1)
			07-08 (2)	02-04 (1)*
			08-10 (3)	04-06 (2)*
			10-12 (2)	06-07 (1)*
			12-13 (1)	
Caribbean, Central America & Northern Countries of South America	11-13 (1)	08-09 (1)	07-08 (1)	19-21 (1)
	13-15 (2)	09-12 (2)	08-09 (2)	21-02 (3)
	15-17 (1)	12-14 (3)	09-10 (3)	02-04 (2)
		14-15 (4)	10-15 (2)	04-07 (1)
		15-16 (3)	15-17 (3)	20-22 (1)*
		16-17 (2)	17-19 (4)	22-03 (2)*
		17-18 (1)	19-21 (3)	03-05 (1)*
			21-23 (2)	
			23-00 (1)	
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	13-14 (1)	09-10 (1)	08-10 (1)	21-23 (1)
	14-16 (2)	10-11 (2)	13-15 (1)	23-02 (2)
	16-17 (1)	11-13 (1)	15-17 (2)	02-04 (1)
		13-15 (2)	17-20 (4)	00-03 (1)*
		15-17 (3)	20-21 (3)	
		17-18 (2)	21-22 (2)	
		18-19 (1)	22-00 (1)	
McMurdo Sound, Antarctica	Nil	16-19 (1)	07-10 (1)	01-03 (1)
			17-19 (1)	03-05 (2)
			19-20 (2)	03-05 (2)
			20-22 (3)	03-06 (1)*
			22-00 (2)	
			00-01 (1)	

#See explanation in "How To Use Short-Skip Charts" in box in this column.
Note: Alaska and Hawaii Propagation Charts are intended for distances greater than 1300 miles. For shorter distances, use the preceding Short-Skip Propagation Chart.
**Indicates best times for 160 meter openings.*
For 12 meter openings interpolate between 10 and 15 meter openings.
For 17 meter openings interpolate between 15 and 20 meter openings.
For 30 meter openings interpolate between 40 and 20 meter openings.

VHF Conditions

Expect some strong, occasional solar flares and related coronal mass ejections (CMEs), possibly triggering aurora during September. The end of September and all of October is the start of the autumnal aurora season. Geomagnetic storms that ignite auroras occur more often during the months around the equinoxes during early autumn and spring. This seasonal effect

has been observed for more than 100 years. When the *Kp*-index is greater than 5, you can expect possible aurora. The higher the *Kp*-index, the more intense the aurora can become. While I don't expect there to be many periods of stormy geomagnetic activity, there is still a strong chance for a few potential storms. Keep your eye on the geomagnetic conditions (you may viisit my propagation page, <http://prop.hfradio.org/> to view current conditions, including aurora activity) for periods where the *Kp* rises above 5 for more than six hours.

The month of September statistically has the lowest amount of sporadic-*E* propagation activity. Toward the end of September trans-equatorial (TE) propagation will begin to occur between southern North America and northern South America. Openings will generally occur in the late afternoon to early evening.

Troposcatter conditions are generally very good for many of the VHF bands up to 440 MHz during September with the appearance of different weather fronts. This will be the primary mode for working up to 300 miles. A very useful internet resource for viewing tropospheric conditions is available at William Hepburn's "VHF /UHF Tropospheric Ducting Forecast" site <http://www.iprimus.ca/~hepburnw/tropo_nat.html>.

Don't forget to check out *CQ VHF* magazine as well as the "VHF Plus" column in this issue for a more in-depth look at VHF propagation. However, no matter what, get on the radio and try working the many modes. The more people active on these bands, the more we can unlock the mysteries of VHF propagation.

Current Solar Cycle Progress

At the time of final writing of this month's column, we are seeing an occasional period of stronger solar activity than in most recent weeks. Sunspot 649 (as numbered by NOAA) has produced 4 X-flares in a 24-hour time span. It is typical during the declining years of a solar cycle to see these occasional solar activity flare-ups. Both HF and VHF DXers welcome them, as these periods of higher solar activity can open up *F*-layer DX windows on the higher bands, even on 6 meters.

The Royal Observatory of Belgium reports that the monthly mean observed sunspot number for June 2004 is 43, up a point from May's 42 and up four points from April's 39, but still down from March's 49. The 12-month running smoothed sunspot number centered on December 2003 is 55, down a bit from November's 57. The lowest daily sunspot value during June 2004 was recorded on June 12, with a count of 18. The highest daily sunspot count for June was 87 on June 21. The high and low for June are higher than the high and low for May 2004. A smoothed sunspot count of 30 is expected for September 2004.

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7-cm observed monthly mean solar flux of 100 for June 2004, the same as for May. The 12-month smoothed 10.7-cm flux centered on December 2003 is 119, three points below November. The predicted smoothed 10.7-cm solar flux for September 2004 is about 87, give or take about 17 points.

The observed monthly mean planetary *A*-index (*Ap*) for June 2004 is 9, the same as for May. The summer geomagnetic activity up until the time of final writing of this month's column has been reasonably calm, with long periods of *Ap* lower than 10. The 12-month smoothed *Ap*-index centered on December 2003 is 19, one point down from November. Expect the overall geomagnetic activity to be quiet during most days in October, with only occasional days of possibly strong geomagnetic activity.

CQ WW DX Contest 2004

In this column's tradition for the past 50 years, next month will be devoted to a special, comprehensive forecast focusing on both weekends of the 2003 CQ WW DX contest, with an update in November's issue for the CW weekend. Besides the usual worldwide band-opening predictions and propagation forecasts, tips and resources will be included for efficient operation and for maximizing scores during the contest periods.

You may e-mail me, write me a letter, or catch me on the HF amateur bands. Please come and participate in my online propagation discussion forum at <http://hfradio.org/forums/>. I look forward to hearing from you. Happy DXing!

73, Tomas, NW7US/AAAØWA

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RSGB 2002 Ed, 224 pages
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RSGB. ©2001. 288 pages. **$34.95.**
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50 HF antennas, 14 VHF/UHF/SHF antennas, 3 receiving antennas, 6 articles on masts and supports, 9 articles on tuning and measuring, 4 on antenna construction, 5 on design and theory, and 9 Peter Hart antenna reviews. Every band from 73kHz to 2.3GHz!

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RSGB. 2nd Ed, 1996. 160 pages.
Takes the guesswork out of adjusting any antenna, home-made or commercial, and makes sure that it's working with maximum efficiency. Describes RF measuring equipment and its use, constructing your own antenna test range, computer modeling antennas. An invaluable companion for all those who wish to get the best results from antennas!

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Edited by Dick Biddulph, G8DPS and Chris Lorek, G4HCL.
RSGB, 7th Ed., 2000, 820 pages.
This book is an invaluable reference for radio amateurs everywhere. It also provides a comprehensive guide to practical radio, from LF to the GHz bands, for professionals and students.

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By Fred Handscombe, G4BWP.
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Results Of The 2003 CQ WW DX CW Contest *(from page 25)*

Number groups after call letters denote following: Band (A = all), Final Score, Number of QSOs, Zones, and Countries. An asterisk (*) before a call indicates low power. Certificate winners are listed in bold. (All country terminology reflects the DXCC list at the time of the contest.)

SINGLE OPERATOR

NORTH AMERICA

UNITED STATES

NT1Y	**A**	**6,797,675**	**4090**	**142**	**493**
					(OP: W4PA)
K1DG	*	**6,407,730**	**3825**	**147**	**483**
W1KM	*	**5,758,782**	**3449**	**146**	**455**
K5ZD/1	*	**5,665,749**	**3153**	**146**	**485**
KT1V	*	5,616,416	3518	142	456
W1WEF	*	5,342,400	3081	145	485
KQ2M/1	*	4,793,580	3363	135	405
K1ZZ	*	4,642,542	2826	134	443
WC1M	*	4,241,700	2977	132	408
NN1N	*	3,474,205	2101	142	453
W1GF	*	3,039,841	2027	125	428
N1RR	*	2,982,084	2188	124	418
K5MA/1	*	2,790,564	2097	115	363
W1ECT	*	2,508,792	1967	110	363
KC1F	*	2,428,472	2001	109	319
K1NQ	*	2,208,987	1974	108	369
W1UK	*	1,863,225	1405	110	397
AA1ON	*	1,449,624	1329	102	306
W1RH	*	1,395,680	1001	118	402
W1ZK	*	1,028,200	895	105	319
KG1E	*	872,900	852	103	303
AK1N	*	663,404	644	111	295
W1ZS	*	573,231	647	73	254
K1BV	*	479,084	627	78	249
KE1FO	*	318,897	552	75	204
K1KU	*	280,497	427	63	196
N1SV	*	146,740	265	62	168
K1BD	*	143,424	258	64	152
N1HRA	*	126,711	206	65	182
N4XR/1	*	119,544	223	62	142
KA1VMG	*	57,246	186	55	119
K1CN	*	37,374	114	45	93
K1EU	*	35,164	119	50	99
N1KJF	*	2,703	39	17	34
K1EA	**21**	**859,284**	**2017**	**36**	**122**
K1QS	**14**	**126,360**	**360**	**37**	**119**
W1MK	**3.5**	**332,860**	**1194**	**24**	**86**
K1UO	**1.8**	**23,332**	**164**	**17**	**59**
***N1UR**	**A**	**2,509,460**	**1711**	**120**	**422**
***KS1J**	*	**2,326,620**	**1682**	**116**	**394**
***W1TE**	*	**1,837,618**	**1198**	**126**	**428**
*WA1Z	*	1,661,903	1204	110	383
*W1EQ	*	1,437,768	1156	106	350
*KA1IS	*	1,427,601	1160	112	359
*K1HT	*	1,356,480	1035	113	358
*W1JQ	*	882,790	836	100	330
*NM1W	*	723,246	595	103	344
*K1EP	*	645,232	675	93	299
*N1DC	*	620,920	657	87	274
*N3KCJ/1	*	508,185	576	84	261
*W1KT	*	460,920	523	78	256
*K1IB	*	431,472	549	70	233
*WG1Z	*	375,724	463	83	233
*AE1T	*	338,525	444	69	206
*K1ZE	*	328,500	392	76	224
*KQ1F	*	285,012	410	64	197
*W1CCE	*	252,960	365	89	221
*W1ECH	*	189,832	323	72	172
*W1WFZ	*	180,992	328	56	168
*W1VET	*	168,912	381	72	204
*KB1T	*	164,034	272	70	164
*KY1B	*	120,290	262	63	167
*N1LW	*	113,058	222	65	133
*AE1D	*	90,801	262	56	121
*W6FC/1	*	56,072	151	53	119
*N1DS	*	55,692	170	53	103
*W2SUQ/1	*	51,696	136	41	103
*KV1J	*	47,428	133	49	93
*K1SM	*	45,276	147	36	96
*K1KAV	*	20,564	80	37	69
*K1SND	*	16,359	117	38	85
*W1AWB	*	14,094	69	23	58
***W1END**	**28**	**97,344**	**303**	**26**	**91**
*KG1V	*	2,528	45	12	20
*KA1RFD	21	936	24	10	16
*AA1M	14	25,692	125	23	66
*K1VSJ	*	12,765	82	21	49
***W1MU**	**7**	**295,212**	**732**	**34**	**112**
*WA1FCN	*	84,842	335	27	91
***K2LP/1**	**3.5**	**6,425**	**127**	**12**	**48**
N2LT	**A**	**5,585,356**	**3327**	**144**	**458**
WW2Y	*	**3,971,744**	**2969**	**131**	**413**
K2TW	*	3,500,126	2512	121	397
W2LC	*	3,075,197	2067	131	426
W2EN	*	2,670,230	1919	128	386
K2NV	*	2,570,366	1619	138	440
W1GD/2	*	2,164,075	1495	124	411
K2FU	*	1,386,432	1062	115	383
W2XL	*	1,200,120	1056	107	304
N2MR	*	714,912	754	84	268
KA2MGE	*	606,788	625	99	265
KE2WY	*	555,210	648	97	301
KZ2I	*	450,996	503	101	253
WB2HJV	*	343,392	455	74	218
W2BC	*	290,788	795	31	108
W2TX	*	240,960	355	57	183
WK2W	*	134,685	241	67	138
W2GB	*	128,482	280	62	165
W2GDJ	*	107,010	236	52	122
K2NJ	**28**	**341,341**	**855**	**32**	**111**
N2MF	**21**	**706,119**	**1645**	**38**	**121**
N2VM	14	22,204	109	26	65
WB2ABD	**7**	**135,340**	**376**	**31**	**103**
N2GC	**3.5**	**92,763**	**358**	**19**	**80**
NA2X	*	25,308	124	17	59
W2VO	1.8	780	23	7	13
***K2PS**	**A**	**1,875,384**	**1389**	**116**	**372**
***WB2AA**	*	**1,350,720**	**1036**	**106**	**374**
*K2EK	*	705,912	688	93	309
*KM2L	*	632,913	668	89	250
*WA2VZQ	*	575,482	649	90	270
*N2TN	*	427,363	418	111	280
*K2CS	*	420,552	510	91	233
*K2UF	*	406,684	518	70	223
*K2UR	*	363,608	452	71	230
*W2TZ	*	344,172	521	61	197
*NS2P	*	323,442	490	72	234
*K2KQ	*	306,436	359	86	246
*WA2YSJ	*	291,768	424	73	229
*W2CVW	*	257,306	388	77	218
*KA2BZS	*	232,260	354	79	215
*K2TWI	*	209,804	347	61	175
*WA2VQV	*	187,110	300	71	172
*K2TV	*	125,248	248	61	145
*K2YLH	*	74,256	226	55	127
*WA2IAU	*	71,476	189	50	117
*WA2BMH	*	70,238	147	58	115
*N2LK	*	64,635	177	55	100
*W2EZ	*	62,546	195	47	108
*N2CG	*	56,848	163	41	95
*W2/KP3T	*	38,181	136	49	94
*W3EH/2	*	23,862	98	31	66
*K2FS	*	22,816	83	43	79
*K2YR	*	21,384	88	35	64
*WA2MCR	*	21,222	123	44	87
*K2MK	*	21,060	97	28	62
*WB2DZH	*	14,378	95	25	54
*WA2JQK	*	14,248	105	52	85
*N2JJF	*	1,575	31	15	20
*AB2QK	*	1,457	36	19	28
*N2QOR	*	100	93	36	58
*N2BZP	*	100	14	8	11
*KV2M	*	71	10	6	7
***K2MFY**	**21**	**203,616**	**544**	**31**	**113**
*WB2BXO	*	43,566	152	24	82
*KX2S	*	22,866	120	19	55
***N2EE**	**7**	**252,702**	**751**	**33**	**106**
					(OP: K3BU)
***N2TA**	**3.5**	**52,922**	**242**	**18**	**76**
					(OP: NP3D)
*W2TO	*	20,716	125	13	58
K3CR	**A**	**5,999,752**	**3388**	**155**	**483**
					(OP: LZ4AX)
K3ZO	*	**5,382,828**	**3134**	**148**	**473**
AA1K/3	*	4,930,795	3162	148	445
W3BGN	*	4,607,080	2839	146	450
K3TW	*	1,515,276	1260	111	330
K3TC	*	1,309,890	1090	115	355
N3UM	*	1,299,144	1172	101	306
W3BG	*	990,689	786	101	360
K3JGJ	*	924,702	822	115	343
K4JLD/3	*	776,785	682	120	341
N3ND	*	744,256	702	103	298
N3JT	*	712,069	679	102	307
N3KR	*	708,440	699	95	303
N3BNA	*	682,981	579	107	384
W3BYX	*	647,955	665	93	292
W3BW	*	614,250	538	114	341
K3ZX	*	452,704	508	90	254
N2EA/3	*	445,665	437	111	296
K3VA	*	396,500	539	76	229
W3RJ	*	395,620	608	71	191
K3SX	*	368,200	442	98	252
N3RJ	*	352,363	551	75	236
W3AP	*	319,497	472	81	200
K3GW	*	303,930	362	86	244
W2TN/3	*	272,412	464	90	232
W3KV	*	232,958	378	68	201
K3JG	*	185,900	261	63	212
WA3IIA	*	149,112	264	60	158
N3NZ	*	139,748	284	54	142
W9GE/3	*	110,556	282	81	168
N3NR	*	85,070	204	58	123
W8PT/3	*	73,344	192	65	126
KD3TB	*	54,462	151	47	127
W3GNQ	*	39,767	166	54	107
W3GN	*	28,776	116	34	75
W3FQE	*	10,403	112	36	65
WA3AAN	**21**	**71,604**	**275**	**22**	**86**
AI3Q	*	50,601	196	25	76
WY3T	**14**	**94,996**	**311**	**30**	**97**
KT3Y	**7**	**743,314**	**1928**	**32**	**111**
***W3EF**	**A**	**1,904,352**	**1543**	**110**	**368**
***K3NK**	*	**1,420,092**	**1081**	**119**	**367**
*WW3S	*	1,391,974	1056	116	363
*W3IUU	*	770,742	749	97	281
*NS3T	*	749,328	754	95	307
*K3IE	*	668,174	684	104	299
*K3EGE	*	551,420	589	85	264
*W2CDO/3	*	517,638	714	84	257
*AA3DF	*	471,040	572	62	258
*KE3VV	*	458,208	552	81	252
*AA3YV	*	399,711	594	67	210
*WA1LWS/3	*	395,200	484	78	226
*N3WT	*	358,120	483	68	212
*K1EFI/3	*	271,194	415	57	174
*WK3H	*	254,540	356	71	189
*N3HCN	*	246,264	390	68	180
*NG3K	*	151,000	223	61	189
*W3BEN	*	109,509	234	60	151
*K3ATO	*	106,778	221	59	144
*W3XG	*	96,642	206	53	129
*W3CB	*	63,722	175	46	105
*AB3AI	*	60,352	163	51	113
*K3STX	*	58,268	162	41	111
*W3WH	*	42,350	150	51	103
*N3RW	*	39,308	136	42	82
*K1DS/3	*	32,382	125	43	83
*N3XL	*	31,780	181	44	96
*N9GG/3	*	29,382	118	33	85
*K3WGR	*	25,944	128	51	87
*WX3B	*	12,089	64	26	51
*K3QC	*	7,952	52	28	40
*K3FH	*	24	2	2	2
*N3MX	14	1,539	20	10	17
*K3JHT	*	760	15	8	12
***NA3M**	**7**	**23,436**	**134**	**19**	**74**
K1TO/4	**A**	**4,371,558**	**2763**	**145**	**444**
W4RX	*	**1,986,834**	**1460**	**139**	**399**
W3GQ/4	*	1,486,064	1078	124	400
K4ZW	*	1,327,068	1222	109	277
KD5M/4	*	1,252,470	994	126	372
NU4Y	*	1,246,062	881	134	448
W4RQ	*	1,213,676	1027	119	363
W4YE	*	1,211,232	1003	100	344
K4LTA	*	1,103,766	1195	103	323
W4QM	*	1,099,716	950	112	340
K4WX	*	1,085,292	1123	89	262
W1MO/4	*	1,063,980	921	96	318
WØYR/4	*	951,280	1002	93	283
K4PV	*	810,492	1221	95	253
W4NZ	*	730,112	722	97	271
W4/G4BUE	*	575,752	838	86	230
W2YE/4	*	502,992	567	92	244
W9WI/4	*	500,112	631	95	207
N4IR	*	496,353	690	67	200
WF3J/4	*	493,521	540	77	254
N4TN	*	452,808	508	86	256
W4NTI	*	431,520	515	100	248
K4PB	*	401,704	457	93	244
N4AA	*	382,140	424	96	234
KR4M	*	315,700	415	86	201
KØCOP/4	*	312,744	447	77	237
N4MM	*	311,021	397	96	238
K4XG	*	281,843	391	81	200
ACØM/4	*	209,876	292	72	212
WB4MSG	*	205,000	348	71	179
W4SI	*	150,936	297	65	163
K2SD/4	*	134,820	291	63	147
K4WJ	*	103,320	219	61	119
W4GMY	*	101,384	246	71	161
W4EI	*	94,284	212	64	130
KC4D	*	93,425	210	64	121
W4RK	*	76,653	207	51	116
W4KJ	*	71,340	257	67	138
NC4S	*	67,689	263	62	145
W7QF/4	*	66,132	173	70	128
KG4NEP	*	66,010	154	57	104
W3TMZ/4	*	56,496	126	66	110
N4UH	*	43,099	149	39	92
AA3VA/4	*	41,022	148	30	76
K4CEB	*	40,800	119	54	82
N4TL	*	25,560	115	45	75
N4EIL	*	8,954	99	25	49
W4DR	*	6,915	61	24	43
K4OH	*	100	211	70	141
W4ZV	**28**	**664,092**	**1566**	**34**	**122**
N4GN	*	**437,044**	**1079**	**33**	**115**
K9OM/4	*	**429,266**	**1142**	**32**	**110**
K4OAQ	**21**	**470,658**	**1227**	**31**	**110**
W1MD/4	*	**402,500**	**1169**	**30**	**110**
K4RV	*	265,350	706	33	117
W4ZYT	**14**	**85,050**	**246**	**32**	**94**
N4NX	**7**	**125,280**	**367**	**35**	**110**
K5UA/4	*	76,346	253	27	91
N4CC	**3.5**	**97,519**	**318**	**26**	**87**
K4DLJ	*	55,284	258	23	79
K1UM/4	*	9,880	82	17	48
W4SVO	**1.8**	**1,912**	**54**	**9**	**23**
K7UIR/4	*	18	15	4	2
***N4YDU**	**A**	**1,932,984**	**1498**	**116**	**397**
***K4GKD**	*	**1,682,681**	**1164**	**129**	**404**
*K4AMC	*	1,412,416	1125	115	349
*WO4O	*	1,337,985	1088	117	360
*NA4K	*	1,314,138	1049	120	349
*N4PSE	*	1,265,240	1037	113	357
*N4IG	*	1,234,506	1020	109	333
*K4MM	*	1,198,008	885	123	381
*K4EU	*	1,084,907	885	110	333
*K4FPF	*	1,027,076	879	94	339
*KØEJ/4	*	931,840	872	118	298
*K4IE	*	844,419	807	97	300
*K3WA/4	*	634,746	634	86	295
*WA4JUK	*	473,193	594	85	248
*K7CMZ/4	*	447,769	544	86	243
*KU8E/4	*	436,560	503	96	244
*N4QV	*	431,462	489	94	252
*WA4DOU	*	406,296	515	75	222
*KI3O/4	*	344,544	456	75	221
*KE1F/4	*	308,256	445	73	231
*KN4Y	*	305,152	492	74	224
*W4UUM	*	254,208	357	65	191
*N2WN/4	*	211,185	317	85	200
*AE4Y	*	206,172	297	63	186
*N4JED	*	195,720	323	64	169
*K4VU	*	192,114	317	68	166
*N4EK	*	152,256	285	55	153
*W4TE	*	129,055	210	67	198
*NW4V	*	127,120	235	68	159
*AA4KD	*	116,748	248	62	145
*K4MX	*	115,052	217	62	134
*K4GHS	*	115,050	263	58	137
*WD4AHZ	*	101,210	249	41	104
*K4HA	*	97,920	209	44	136
*K4GA	*	96,473	214	56	125
*K4BEV	*	85,500	166	76	149
*KB4N	*	78,456	211	52	116
*W4EBA	*	78,352	197	51	115
*WB4DNL	*	69,645	426	69	130
*K9ES/4	*	65,598	199	53	121
*NN4DF	*	58,830	182	49	110
*W7IY/4	*	57,456	143	51	120
*K4JAF	*	57,000	160	58	142
*K4HV	*	55,264	155	53	104
*WR4K	*	50,976	136	45	99
*K4OGG	*	40,222	125	34	85
*AJ2U/4	*	37,200	124	39	85
*WA4FXX	*	34,823	140	25	72
*N1PA/4	*	34,276	127	51	113
*KS4YX	*	29,952	136	35	82
*WB4ABW	*	25,704	119	36	72
*N8GM/4	*	24,934	106	50	77
*N4VM	*	14,105	74	40	51
*AI4CB	*	9,796	60	29	50
*K4FTO	*	8,968	81	30	46
*KC9LC/4	*	992	19	16	16
*NA4MA	*	800	15	10	15
*KD4RM	*	432	13	8	10
*AE4EC	*	100	64	35	46
***K4WI**	**28**	**233,883**	**721**	**29**	**88**
*N4HXI	*	100	25	10	15
***N4MO**	**21**	**245,857**	**668**	**30**	**109**
***WB4TDH**	*	**224,190**	**567**	**30**	**111**
*AA4FU	*	15,620	89	18	53
*K4AGT	*	13,467	86	16	51
***K9AW/4**	**14**	**70,312**	**197**	**31**	**105**
*N4NTO	*	3,000	63	14	26
***K2RR/4**	**7**	**50,589**	**223**	**22**	**77**
***NA4W**	**1.8**	**1,904**	**60**	**9**	**19**
					(OP: K4WI)
K5GN	**A**	**4,457,700**	**2803**	**163**	**472**
W5KFT	*	**3,189,931**	**2358**	**143**	**384**
					(OP: K5PI)
N3BB/5	*	2,264,020	2027	117	334
N5RG	*	1,492,953	1176	130	353
N5KA	*	1,066,240	850	117	373
N5PA	*	601,956	606	100	314
W5OM	*	585,354	707	89	273
K5YAA	*	485,184	583	101	235
WQ5L	*	460,970	535	83	227
K5ZO	*	441,956	693	100	213
K5LP	*	278,481	413	80	187
N5TY	*	165,186	228	87	179
N5PU	*	149,586	303	64	169
W5FO	*	143,190	267	68	154
N5DY	*	60,450	149	51	99
K5RX	**28**	**507,072**	**1257**	**33**	**119**
AC5ML	*	159,000	884	32	93
AD5Q	**21**	**473,838**	**1181**	**34**	**117**
K2BA/5	*	381,304	947	36	118
K1NT/5	**14**	**257,972**	**675**	**36**	**128**
W5UN	**7**	**508,886**	**1199**	**38**	**125**
N5OT	*	223,938	695	31	112
K5RA	*	83,422	312	28	78
WØUO/5	**3.5**	**38,930**	**207**	**23**	**62**
N5JB	**1.8**	**7,448**	**75**	**16**	**40**
W5MJ	*	819	25	9	12
***N5AW**	**A**	**2,142,623**	**1307**	**149**	**458**
***W5EKF**	*	**869,425**	**793**	**103**	**316**
*WØVX/5	*	835,419	766	96	307
*WD5K	*	722,942	722	98	276
*WA5SOG	*	332,920	466	84	203
*K5UV	*	229,392	379	76	167
*N5CHA	*	218,373	346	83	166
*KS5V	*	120,098	246	74	132
*W5KI	*	117,414	223	64	134
*NI5F	*	102,600	343	70	130
*KDCIE/5	*	89,950	222	56	119
*AK5X	*	77,832	191	60	124
*W5TA	*	76,201	199	60	121
*W5IL	*	58,674	172	56	98
*WK5K	*	47,250	147	51	84
*W5RW	*	44,772	175	58	106
*KD5MJJ	*	40,259	133	41	86
*KA5EYH	*	25,725	143	57	90
*AJ4F/5	*	23,072	104	43	69
*K5GM	*	7,800	55	27	38
*N5NJ	*	5,300	45	23	30
*W5WZ	*	100	20	11	9
***W5OT**	**28**	**37,980**	**221**	**23**	**67**
					(OP: WA5TWL)
***N5DO**	**21**	**201,576**	**497**	**34**	**114**
*WT5U	*	2,720	43	12	28
*NEØP/5	3.5	680	20	8	9
K6NA	**A**	**1,676,741**	**1333**	**146**	**341**
N7CW/6	*	**1,145,898**	**873**	**140**	**358**
W6UM	*	821,340	634	135	333
WR6M	*	807,690	824	121	269
K6KM	*	786,129	1001	115	206
					(OP: AD6TF)
WA5VGI/6	*	642,784	676	128	251
K6LRN	*	541,824	549	130	254
N5TW	*	431,310	525	104	226
W6NKR	*	195,424	305	86	162
N6NG	*	192,780	294	86	169
K6YK	*	144,072	265	79	128
WT6G	*	117,162	259	74	133
NF6V	*	106,652	250	71	111
W6FRH	*	102,305	226	77	108
AJ6V	*	101,376	267	53	91
NO6X	*	57,961	160	64	85
W6OUL	*	56,210	164	60	94
N6OL	*	45,784	187	47	78
WA6PY	*	23,389	98	45	65
K6SRZ	*	22,729	81	50	69
WA6BOB	*	17,595	91	37	48
W6TE	*	14,250	67	51	63
WA6OGO	*	13,272	81	36	43
W6ISO	*	11,125	63	38	51
K6XC	*	9,324	51	32	42
NY6Y	*	5,346	81	39	60
KC6X	**21**	**110,695**	**324**	**32**	**99**
W6DCC	*	32,451	173	23	64
W6MVW	14	17,936	98	23	53
W6OPO	*	100	74	20	38
NF6S	**7**	**191,662**	**642**	**32**	**90**
KA6SAR	*	122,520	498	32	88
K6SE	**1.8**	**575**	**36**	**9**	**14**
***W6PH**	**A**	**1,193,136**	**937**	**101**	**368**
***N6NF**	*	**771,490**	**806**	**117**	**241**
*WN6K	*	377,733	671	92	157
*W6RCL	*	188,032	344	86	140
*NE6Z	*	122,232	198	90	174
*W6ZL	*	113,183	245	68	93
*N6YEU	*	107,536	207	65	123
*AA6EE	*	101,503	266	63	114
*WA6BIL	*	98,592	244	67	91
*K6UM	*	68,796	163	69	87
*AA6DX	*	67,353	190	70	87
*NK6A	*	67,196	190	59	98
*K6CSL	*	42,214	159	61	75
*KE6QR	*	33,100	146	43	57
*W6IYS	*	18,721	99	38	59
*K6RFM	*	17,328	97	33	43
*W6CWM	*	15,960	138	47	67
*K6VVA	*	4,263	39	21	28
*KN6Y	*	2,774	164	63	83
*W6ZZZ	*	1,836	33	19	17
*N6IV	*	217	19	15	16
***N6RV**	**28**	**77,486**	**292**	**30**	**75**
***AE9F/6**	**21**	**76,002**	**278**	**31**	**75**
*KU6T	7	5,264	55	20	27
*K6MI	1.8	42	11	6	8
N7RT	**A**	**3,923,724**	**2535**	**164**	**424**
					(OP: N2IC)
K7NV	*	**1,797,873**	**1463**	**142**	**331**
W2VJN/7	*	1,682,200	1243	155	365
WA7LT	*	1,308,080	1277	131	284
K7ZA	*	1,045,262	908	133	300
K7WP	*	732,400	721	119	281
W8AEF/7	*	685,335	685	130	297
N7TT	*	682,915	745	118	247
K7VI	*	615,000	732	103	225
K7ABV	*	396,800	487	99	221
K7SS	*	363,248	481	99	193
W7YS	*	349,116	477	85	197
W7QN	*	237,744	406	81	153
KØJJ/7	*	227,240	326	88	172
W6AEA/7	*	139,800	338	69	131
KX7J	*	97,016	264	62	126
NI7R	*	95,186	202	69	113
W7IIT	*	91,071	217	61	119
NE9Z/7	*	81,120	169	69	126
KS7T	*	78,556	185	65	99
AF7Y	*	73,211	265	72	107
WN7T	*	70,409	239	78	103
N6PZ/7	*	47,400	147	42	78
KC7UP	*	44,640	135	58	86
W7AT	*	33,205	134	60	85
					(OP: W7EW)
N7TL	*	32,332	151	56	81
W7CB	*	22,680	102	44	64
N7US	*	18,507	71	43	50
W7DPW	*	13,530	99	36	46
WM7A	*	2,303	29	21	26
WG7X	*	2,107	41	23	26
W9PL/7	*	2,059	25	13	16
WE7K	*	300	15	8	12
W9NGA/7	**21**	**238,836**	**627**	**36**	**120**
K7DX	*	**223,310**	**713**	**34**	**103**
W6RLL/7	*	92,073	268	37	104
W7AYY	*	4,204	40	16	27
W7WA	**14**	**621,075**	**1363**	**38**	**131**
N7WA	*	238,815	669	34	111
N6HR/7	*	182,676	460	36	120
N6MZ/7	*	149,058	370	36	111
W7LGG	**7**	**33,523**	**139**	**32**	**76**
***N7NG**	**A**	**1,361,710**	**999**	**105**	**385**
***K8IA/7**	*	**1,208,765**	**1021**	**124**	**333**
*K7HBN	*	571,269	633	102	225
*W7QDM	*	495,473	585	113	228
*KI7Y	*	474,948	563	108	208
*AB7RW	*	292,314	417	86	172
*WA7VNI	*	153,080	340	64	108
*K7LAZ	*	149,612	284	78	148
*N7ZN	*	122,400	250	72	108
*K7GS	*	110,295	239	63	108
*W7HS	*	105,937	235	77	134
*N3AIU/7	*	59,444	174	69	85
*W7ZMD	*	52,785	181	48	87
*N7LOX	*	49,972	147	53	71
*N7ZG	*	37,788	146	55	86
*W7GTO	*	37,572	138	51	73
*AB7R	*	32,318	110	41	72
*KC7NUP	*	29,140	125	39	55
*WA6AWD/7	*	26,132	116	40	54
*W7MD	*	18,614	96	35	47
*W7GK	*	15,392	89	28	46
*W7TCP	*	13,588

*KB9OWD	*	87,261	227	60	117
*W9HLY	*	73,500	202	40	100
*K9MI	*	41,237	128	47	90
*W9LYA	*	24,514	123	45	74
*K9OZ	*	16,170	114	34	71
*AA9NF	*	15,624	63	39	54
*W9CA	*	9,555	70	32	59
			(OP: KK9OX)		
*K9KM	*	6,466	45	27	34
*N9TTX	*	5,915	50	30	33
*W9HR	*	5,796	42	26	51
*W9ISC	*	3,484	40	23	29
*N9XO	*	2,903	31	17	26
***K9WA**	**28**	**67,716**	**241**	**24**	**75**
***W9ILY**	**21**	**155,574**	**436**	**29**	**105**
*NI9C	*	30,480	136	21	59
*K9QH	*	234	7	6	7
***W9AU**	**14**	**139,725**	**377**	**31**	**104**
*N9GBB	*	621	14	7	13
***K9WJU**	**7**	**30,816**	**129**	**22**	**74**
			(OP: W9CG)		
*WD8AHR/9	*	11,400	102	13	47
*N9WI	3.5	112	8	7	7
KØSR	**A**	**2,620,431**	**1888**	**138**	**423**
KØCAT	*	**1,621,376**	**1237**	**116**	**362**
			(OP: K9WIE)		
WØGG	*	971,082	904	125	316
KØDEQ	*	767,004	708	115	282
KØJPL	*	734,977	716	106	277
KGØUA	*	461,258	534	98	231
WØHW	*	393,442	585	96	218
KJØG	*	376,053	563	105	204
WØZQ	*	319,790	436	87	196
WØID	*	293,040	427	92	204
KØRI	*	199,504	303	95	201
KØGT	*	137,164	245	68	144
K1KD/Ø	*	20,880	89	25	65
WØMN	*	5,916	55	30	38
KØCOM	*	812	15	13	15
WNØL	**21**	**59,800**	**256**	**30**	**85**
N9JF/Ø	**7**	**270,355**	**780**	**34**	**105**
***WØETT**	**A**	**446,550**	**544**	**92**	**233**
***NØFP**	*	**397,524**	**511**	**92**	**222**
*K7RE/Ø	*	393,206	629	90	203
*KØCF	*	280,502	387	84	194
*KØSQ	*	242,176	361	78	178
*NAØN	*	203,392	335	60	164
*KNØV	*	178,106	294	64	154
*KØMPH	*	150,304	313	69	155
*KSØM	*	145,040	316	74	171
*WØPI	*	132,840	244	71	145
*WAØMHJ	*	132,733	262	68	131
*NN7A/Ø	*	89,112	197	75	113
*KØRY	*	65,505	196	60	105
*NØSXX	*	56,160	174	56	88
*NØIBT	*	37,206	136	50	67
*KØEX	*	35,340	126	43	71
*K2HT/Ø	*	34,589	132	50	88
*AD4OS/Ø	*	24,976	102	44	68
*KBØCRG	*	24,514	129	45	74
*KØVX	*	14,454	84	25	41
*KØKGS	*	13,000	146	43	87
*WN8P/Ø	*	12,602	87	26	44
*WØETC	*	11,154	59	36	42
*KFØXV	*	7,844	56	32	44
*WØEB	*	5,719	55	12	31
*KAØDAQ	*	5,676	54	27	39
*KSØT	*	4,806	38	27	27
*NØOA	*	406	76	27	31
***K4RDU/Ø**	**28**	**58,320**	**205**	**27**	**81**
***NØNR**	**14**	**182,376**	**467**	**34**	**115**
*K9DCV/Ø	7	2,835	38	12	23
		ALASKA			
KL7XX	**A**	**733,736**	**986**	**117**	**211**
KL7FH	*	198,468	680	48	100
AL1G	*	18,632	141	31	37
KL7WV	*	16,082	242	17	17
			(OP: W3YQ)		
KL7RA	**7**	**397,383**	**1296**	**32**	**95**
		ANTIGUA			
***V26K**	**A**	**8,212,275**	**5697**	**137**	**428**
			(OP: AA3B)		
		BARBADOS			
***8P5A**	**A**	**8,859,500**	**6175**	**140**	**440**
			(OP: W2SC)		
		BELIZE			
***V31LZ**	**28**	**327,549**	**1290**	**29**	**94**
		BERMUDA			
***VP9I**	**A**	**5,854,420**	**4827**	**120**	**386**
			(OP: K1XM)		
***VP9/K9CC**	**14**	**199,872**	**1045**	**21**	**75**
		CANADA			
VY2ZM	**A**	**9,763,140**	**6176**	**147**	**473**
			(OP: N2NT)		
VY2TT	*	**6,843,837**	**5836**	**133**	**426**
			(OP: K5LA)		
VO1AU	*	**5,209,820**	**4411**	**113**	**353**
VE1JF	*	4,891,860	3780	133	407
			(OP: NB1B)		
VO1MP	*	3,730,531	2989	114	379
VE1OP	*	2,748,915	1964	121	434
VO1TA	*	1,419,492	1687	89	259
***VE9DX**	**A**	**2,195,304**	**1802**	**112**	**380**
*VE1RGB	*	673,254	763	79	260
VE2IM	**A**	**10,053,072**	**6459**	**143**	**505**
			(OP: VE3DZ)		
VE2AYU	*	1,770,300	1677	94	326
VE2RA	*	308,853	953	74	169
***VE2AWR**	**A**	**932,607**	**1119**	**89**	**262**
*VE2FFE	*	44,290	206	38	65
*VE2DSK	*	7,980	76	23	37
***VE2SG**	**28**	**56,052**	**353**	**20**	**61**
*VE2QY	*	930	40	9	21
*VE2OWL	21	1,972	28	9	25
VE3AT	**A**	**5,572,200**	**4051**	**133**	**422**
VE3NE	*	**4,422,488**	**3546**	**132**	**391**
VE3EY	*	3,045,600	2670	117	353
VA3UA	*	2,819,664	2963	111	321
VE3PN	*	1,042,245	1028	118	319
***VE3JM**	**A**	**2,446,080**	**2079**	**108**	**372**
***VE3XD**	*	**1,258,432**	**1120**	**108**	**340**
*VE3KP	*	1,183,000	1495	86	264
*VE3XB	*	1,182,028	1191	102	310
*VE3BW	*	984,060	1071	103	282
*VE3OM	*	712,763	694	90	293
*VE3SMA	*	588,027	702	71	238
*VE3JCV	*	407,949	515	81	242
*VE3EN	*	398,036	598	73	229
*VA3NR	*	359,910	586	90	180
*VA3PL	*	293,926	412	79	202
*VE3GLO	*	292,560	533	77	188
*VA3EC	*	292,458	499	63	174
*VA3XRZ	*	161,102	332	76	142
*VE3LFA	*	81,375	243	50	105
*VA3IX	*	77,409	294	50	91
*VA3CDX	*	43,865	111	48	107
*VA3DX	*	39,900	114	45	88
*VE3XAT	*	30,067	157	40	67
*VE3RER	*	11,410	74	24	46
*VE3RCN	*	4,520	56	13	27
*VA3AVP	*	100	177	33	40
		CUBA			
***CO8LY**	**A**	**2,600,920**	**3308**	**100**	**292**
***CO8ZZ**	**7**	**288,054**	**1091**	**23**	**94**
*CO2JD	*	228,248	1132	23	80
***CO8DM**	**3.5**	**82,212**	**541**	**18**	**60**
*CO8TW	1.8	1,496	47	6	11
		DOMINICAN REPUBLIC			
***HI3K**	**A**	**4,522,580**	**4127**	**125**	**375**
*HI8RV	*	906,526	1735	78	176
		GRENADA			
***J38AA**	**A**	**4,059,055**	**4037**	**111**	**344**
			(OP: WA1S)		
		JAMAICA			
*6Y5/K2KW	28	14,308	103	15	34
***6Y9A**	**21**	**969,088**	**3149**	**31**	**103**
			(OP: WA6O)		

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***VA3RJ**	**21**	**56,742**	**227**	**22**	**76**
***VE3CR**	**7**	**99,456**	**369**	**27**	**84**
*VE3SPW	*	43,568	240	19	69
*VA3HUN	*	2,185	54	9	13
***VE3OSZ**	**3.5**	**83,160**	**429**	**18**	**70**
***VE5SF**	**A**	**998,834**	**1504**	**95**	**219**
*VE5AAD	*	69,184	290	49	78
***VE5ZX**	**21**	**270,816**	**1034**	**29**	**95**
*VE5UF	*	96,096	497	23	68
VE5UA/6	**A**	**1,081,880**	**1504**	**109**	**231**
VE6EPK	*	35,126	195	43	48
VE6JY	**7**	**416,796**	**1426**	**34**	**107**
			(OP: VE6WQ)		
***VE6TN**	**A**	**888,838**	**1349**	**101**	**210**
***VE6EX**	**14**	**194,508**	**867**	**27**	**81**
VE7VR	**A**	**484,496**	**1043**	**83**	**131**
VE7XR	**14**	**458,345**	**1348**	**36**	**109**
VA7XX	*	81,200	227	34	111
***VE7XF**	**A**	**662,676**	**825**	**110**	**212**
*VE7FO	*	534,358	1078	86	141
*VA7ST	*	326,616	851	73	113
*VE7IN	*	233,325	610	73	110
*VE7BZR	*	43,452	175	41	61
*VA7MM	*	8,732	80	28	30
***VA7LC**	**21**	**100,762**	**520**	**27**	**56**
*VE7NI	*	49,560	248	24	60
VY1JA	**A**	**45,087**	**168**	**42**	**71**
		CAYMAN ISLANDS			
ZF1A	**21**	**764,218**	**2640**	**32**	**101**
			(OP: W5ASP)		
ZF2AM	**14**	**1,368,696**	**3457**	**38**	**130**
		COSTA RICA			
TI3M	**14**	**525,507**	**2330**	**34**	**107**
			(OP: TI3TLS)		
***6Y8A**	**3.5**	**382,568**	**1507**	**25**	**91**
		MARTINIQUE			
FM5GU	**1.8**	**138,736**	**836**	**18**	**74**
***FM/T93Y**	**A**	**5,703,100**	**4453**	**124**	**411**
*TO6M	*	890,368	1532	78	218
			(OP: F6AUS)		
		MEXICO			
XE1MM	**A**	**1,795,530**	**2606**	**100**	**230**
XE1V	*	221,340	457	78	177
XE1NTT	**21**	**780,552**	**2331**	**37**	**111**
***XE2MX**	**A**	**232,944**	**414**	**92**	**184**
*XE2AUB	*	26,162	132	48	55
***XE3WAO**	**28**	**78,259**	**463**	**23**	**60**
***XE1NW**	**14**	**119,392**	**725**	**22**	**60**
*XE1L	*	100	127	26	58
		PANAMA			
HP1/DL5XX	**21**	**1,493,100**	**3952**	**38**	**120**
***HP1/DL2BAY**	**A**	**36**	**4**	**3**	**3**
		PUERTO RICO			
KP3Z	**A**	**11,440,230**	**6675**	**174**	**536**
			(OP: N5TJ)		
***NP4H**	**A**	**81,357**	**260**	**55**	**86**
		SAINT MARTIN			
FS5UO	**21**	**1,355,345**	**3547**	**38**	**125**
			(OP: N7DD)		
		ST. VINCENT			
***J88DR**	**A**	**2,797,860**	**3127**	**98**	**324**
		U.S. VIRGIN ISLANDS			
KP2/OK1TN	**21**	**796,081**	**2347**	**32**	**111**
KV4FZ	**1.8**	**43,734**	**469**	**16**	**58**
***NP2L**	**A**	**120,546**	**337**	**55**	**126**
***KP2/N4EXA**	**21**	**583,552**	**2041**	**31**	**97**
			(OP: T93M)		
		AFRICA			
		AFRICAN ITALY			
IH9P	**7**	**1,425,304**	**3272**	**35**	**117**
			(OP: OK1FUA)		
		ALGERIA			
***7X2ARA**	**A**	**4,932,414**	**3769**	**103**	**356**
			(OP: DF4SA)		
		ASCENSION ISLAND			
ZD8Z	**A**	**9,793,390**	**5745**	**159**	**463**
			(OP: N6TJ)		
		CANARY ISLANDS			
EA8ZS	**A**	**7,380,024**	**5589**	**128**	**360**
			(OP: EA5FV)		
EA8EA	**7**	**1,877,050**	**3660**	**38**	**137**
			(OP: OH2MM)		
EA8/OH4NL	**3.5**	**784,254**	**2081**	**33**	**105**
EA8EW	**1.8**	**178,480**	**741**	**19**	**78**
			(OP: OH1MA)		
***EA8CN**	**A**	**4,143,690**	**2836**	**119**	**396**
*EA8DA	*	383,408	576	72	176
*ED8LGP	*	36,890	154	46	73
*EA8AF	*	1,755	27	7	22
***EA8FT**	**21**	**716,254**	**1680**	**35**	**119**
*EA8BBJ	*	6,664	59	15	34
***EA8AVK**	**14**	**157,352**	**582**	**28**	**76**
*EA8AJW	*	100	73	11	21
*EA8JF	1.8	4,455	47	10	35
		CAPE VERDE			
D4B	**A**	**14,226,301**	**6893**	**189**	**568**
			(OP: 4L5A)		
D44TD	**14**	**1,748,937**	**3583**	**39**	**138**
			(OP: IK2NCJ)		
		CHAGOS ISLANDS			
*VQ9ZX	A	3,073	29	20	20
		EGYPT			
***SU9NC**	**A**	**6,656,572**	**4255**	**142**	**417**
*SU9US	*	1,624,950	1792	83	231
		GHANA			
***9G5ZZ**	**14**	**717,948**	**1839**	**35**	**113**
			(OP: DL1CW)		
		IVORY COAST			
TU2MA	**28**	**164,220**	**1180**	**24**	**78**
		MADAGASCAR			
***5R8FU**	**28**	**140,100**	**520**	**27**	**73**
		MADEIRA ISLANDS			
***CT9M**	**A**	**8,232,590**	**4890**	**148**	**465**
			(OP: KL2A)		
*CT3KN	*	1,273,217	1173	90	319
*CT3HF	*	83,190	193	58	119
*CT3KU	28	30,822	198	15	51
*CT3KY	7	3,630	47	9	24
		MOROCCO			
CN2R	**A**	**6,326,208**	**3994**	**134**	**442**
***CN8YR**	**21**	**235,293**	**813**	**25**	**82**
		NIGERIA			
***5N0W**	**A**	**1,023,144**	**1403**	**69**	**198**
			(OP: OK1DXE)		
		SOUTH AFRICA			
ZS4TX	**A**	**6,938,640**	**4451**	**159**	**402**
ZS1EL	**28**	**440,268**	**1346**	**26**	**88**
***ZS1AN**	**A**	**415,002**	**679**	**74**	**167**
*ZS4JAN	*	100	11	8	8
***ZS5RON**	**28**	**62,769**	**411**	**18**	**43**
*ZS6EGB	21	8,880	81	16	32
***ZS6MG**	**7**	**76,335**	**263**	**30**	**75**
		UGANDA			
***5X1X**	**A**	**1,447,896**	**1421**	**101**	**265**
			(OP: K3JT)		
		ASIA			
		AFGHANISTAN			
***YA1BV**	**A**	**176,782**	**610**	**46**	**111**
		ASIATIC RUSSIA			
RX9SX	**A**	**4,712,296**	**3145**	**139**	**445**
UA9CLB	*	**4,022,928**	**3013**	**127**	**377**
RW9TA	*	2,050,884	2001	91	305
UA9KM	*	1,831,536	1671	124	359
UA9MA	*	1,814,448	1755	109	303
UA9KJ	*	1,283,308	1507	94	283
RV9XO	*	1,055,598	994	91	302
RX9TX	*	1,018,400	1079	100	280
UA9FM	*	1,009,701	1205	72	257
RA9MA	*	966,654	1043	92	259
RA9ST	*	449,687	1021	60	223
UA9OS	*	438,039	583	95	262
RV9XJ	*	235,389	469	58	173
UA9AOL	*	211,008	369	53	171
RV9FQ	*	26,004	80	55	77
UA9XS	*	11,911	102	10	33
RA9JR	**28**	**269,490**	**975**	**29**	**101**
RX9LW	*	62,216	340	23	65
RA9UV	*	56,532	367	22	62
RZ9IR	*	25,560	229	8	37
RA9JM	**21**	**204,799**	**734**	**31**	**88**
UA9QFF	*	11,268	131	7	29
RV9JE	**14**	**333,657**	**974**	**31**	**100**
UA9HN	*	230,979	779	27	92
RK9QWZ	*	77,599	404	16	57
			(OP: RW9QA)		
UA9YAB	**7**	**525,464**	**1504**	**36**	**116**
UA9SP	**3.5**	**144,530**	**584**	**19**	**78**
RA9AE	*	**141,440**	**746**	**18**	**67**
RW9QA	*	111,780	652	13	56
RK9AY	*	67,925	419	13	52
UA9MRA	*	30,615	199	12	53
RW9HZZ	*	9,840	96	14	34
			(OP: RZ9IR)		
RL9F	**1.8**	**64,972**	**356**	**16**	**58**
***UA9AYA**	**A**	**4,501,200**	**2824**	**145**	**455**
			(OP: UA9BA)		
***RU9CJ**	*	**1,718,040**	**1633**	**100**	**317**
*UA9AX	*	1,265,792	1024	127	369
*UA9MC	*	969,215	831	110	371
*UA9OC	*	935,693	977	104	303
*RK9AX	*	864,582	1124	77	232
*RU9DD	*	837,385	1001	101	272
*UA9AFS	*	808,038	1019	67	251
*RX9AM	*	790,575	808	106	309
*RK9CR	*	736,802	956	70	243
*UA9DD	*	689,310	702	91	279
*UA9JLL	*	583,520	793	73	207
*UA9OJG	*	440,104	694	66	205
*UA9CBM	*	398,575	607	62	230
*UA9MFB	*	357,438	595	55	191
*RV9AZ	*	353,970	614	70	200
*UA9YE	*	351,260	518	71	189
*RA9FTM	*	341,880	592	56	175
*RX9FB	*	340,707	441	88	249
*UA9LAC	*	301,886	585	62	159
*RW9OC	*	280,567	482	74	195
*RA9XU	*	255,442	601	39	148
*UA9MQR	*	248,992	431	59	192
*UA9XF	*	205,972	366	45	176
*RX9WN	*	198,442	259	96	221
*RZ9IB	*	195,130	516	49	141
*UA9OSV	*	138,678	312	45	129
*RW9IM	*	122,337	270	65	142
*RU9UG	*	112,200	259	46	124
*UA9WZ	*	100,440	260	47	108
*UA9CR	*	99,474	246	48	129
*RW9SZ	*	96,624	296	43	101
*RA9JG	*	80,514	281	38	104
*UA9XMB	*	69,138	214	37	101
*UA9XC	*	48,139	212	21	70
*RX9JM	*	46,860	194	26	84
*RN9AS	*	42,256	166	45	94
*RX9KA	*	26,372	109	47	71
*UA9OAL	*	19,749	118	32	55
*UA9MAC	*	12,400	115	28	72
*UA9OUU	*	10,010	114	20	45
*RZ9OU	*	8,024	66	22	46
***RA9XF**	**28**	**159,043**	**671**	**21**	**68**
*UA9XAB	*	23,119	131	14	47
***UA9FGJ**	**21**	**119,669**	**373**	**29**	**92**
*RA9FF	*	115,441	395	31	101
*RV9CLF	*	32,060	199	15	55
***RX9AF**	**14**	**250,800**	**832**	**28**	**86**
*RA9KM	*	165,000	536	28	92
*RU9WZ	*	92,568	417	28	86
*UA9LAU	*	8,474	78	8	30
*RV9SV	*	3,552	46	17	31
***RK9AD**	**7**	**89,162**	**388**	**28**	**81**
***RN9AA**	**3.5**	**152,768**	**706**	**18**	**70**
UAØAZ	**A**	**896,660**	**914**	**110**	**309**
UAØACG	*	744,806	1228	81	212
UAØABB	*	211,696	418	55	147
UAØBA	*	185,500	410	64	111
RWØUM	*	167,409	524	64	107
UAØCW	*	90,945	191	80	135
UAØYAY	*	34,894	101	62	84
RTØQ	**14**	**851,936**	**2160**	**39**	**119**
			(OP: RZ3BY)		
RAØBA	*	533,232	1354	33	111

RAØCG	*	373,126	1521	32	81
***RUØAW**	**A**	**1,064,271**	**1109**	**93**	**284**
*RAØFU	*	1,012,354	1386	110	224
*UAØWW	*	626,146	801	89	248
*RAØFF	*	580,630	842	104	206
*RAØAKL	*	380,275	589	84	203
*RUØSN	*	156,676	541	48	83
*UAØQNV	*	143,013	388	63	130
*RUØBW	*	94,010	250	53	105
*RWØLIA	*	89,670	220	74	109
*RUØUA	*	82,836	266	63	114
*UAØUV	*	73,500	207	65	110
*UAØFBS	*	50,434	214	65	86
*RAØSDW	*	4,485	67	22	43
*RWØBG	*	4,400	49	14	26
***RWØAR**	**28**	**27,040**	**180**	**11**	**41**
***UAØSAD**	**14**	**199,836**	**614**	**32**	**94**
***RUØLL**	**3.5**	**62,568**	**599**	**26**	**53**
*UAØQGM	1.8	8	4	2	2
ASIATIC TURKEY					
TA2IJ	**7**	**348,700**	**1375**	**23**	**77**
***TA3BN**	**A**	**626,248**	**1245**	**53**	**158**
***TA3DD**	**7**	**379,776**	**1126**	**29**	**99**
AZERBAIJAN					
***4K9W**	**A**	**303,104**	**500**	**66**	**190**
CHINA					
BA4RC	**28**	**184,212**	**901**	**31**	**71**
***B4TB**	**14**	**66,240**	**524**	**28**	**64**
					(OP: BA4TB)
CYPRUS					
P3F	**A**	**10,267,632**	**5510**	**161**	**517**
					(OP: 5B4AGN)
C4W	*	6,959,568	4555	147	441
					(OP: 5B4WN)
5B4AHA	**21**	**448,700**	**1306**	**33**	**107**
5B4AHJ	*	201,843	682	32	91
H2G	**14**	**1,194,620**	**2879**	**35**	**126**
					(OP: 5B4AGC)
HONG KONG					
VR2BG	**A**	**2,665,635**	**2733**	**143**	**336**
INDIA					
***VU2UR**	**A**	**182,528**	**301**	**81**	**175**
***VU2BGS**	**7**	**70,560**	**339**	**23**	**67**
ISRAEL					
4Z5FW	**A**	**388,514**	**987**	**44**	**135**
4X3A	**1.8**	**156,045**	**625**	**21**	**88**
					(OP: 4X4NJ)
***4Z5MU**	**A**	**1,028,082**	**1087**	**111**	**310**
*4X6UU	*	128,013	241	51	162
*4Z5KJ	*	101,265	351	30	99
*4Z5MO	*	20,497	73	43	60
*4Z5QQ	28	30	3	3	3
JAPAN					
JA1ELY	**A**	**3,042,568**	**2045**	**168**	**386**
					(OP: N6ZZ)
JE1CKA	*	**2,076,360**	**1876**	**146**	**294**
JK1OPL	*	1,169,920	996	143	314
JA1JKG	*	997,020	1416	101	189
JA1HP	*	407,061	594	95	184
JM1XCW	*	385,734	529	115	203
JH1UAJ	*	354,640	523	85	175
JA1TMG	*	345,856	565	75	149
JA1QOW	*	320,853	473	88	159
JA1BNW	*	299,980	418	100	183
JI1NJC	*	137,022	250	92	154
JA1BPN	*	119,599	253	80	119
JR1LEV	*	113,040	269	77	103
7J1ABD	*	101,616	237	68	106
JA1CSB	*	78,489	196	68	103
JA1AYO	*	26,600	142	55	78
JL1ANP	*	14,283	93	29	40
JA1HHU	*	11,786	64	35	48
7J1AAI	**21**	**347,784**	**1090**	**35**	**94**
					(OP: W1NN)
JH1AZO	**14**	**27,971**	**193**	**29**	**54**
7N4KDU	*	8,777	70	23	35
JK1LUY	*	357	13	7	10
JH1AEP	**7**	**412,644**	**1230**	**34**	**103**
JS1OYN	*	125,200	494	30	70
JH1OGC	**3.5**	**99,684**	**480**	**30**	**78**
JA1BWA	*	13,780	101	23	42
***JI1RXQ**	**A**	**1,335,152**	**1289**	**137**	**255**
***7M1MCT**	*****	**1,287,678**	**1120**	**140**	**294**
*JK1JHU	*	880,962	1015	131	235
*JHØNVX/1	*	599,886	734	117	205
*JA1RKI	*	398,250	559	102	193
*JA1CP	*	295,250	491	91	159
*JA1BUI	*	262,144	437	97	159
*JA1OZK	*	212,097	449	74	109
*JH1FNU	*	193,070	364	80	135
*JH1SVO	*	176,418	366	90	152
*JE1REU	*	173,808	342	81	123
*JA1XPU	*	141,840	308	81	116
*JI3KHN/1	*	137,280	291	77	115
*JA1PS	*	136,559	295	82	127
*JG1OWV	*	110,442	199	112	125
*JA1TCF	*	101,830	231	69	101
*JM1RPV	*	98,560	225	74	102
*JA1CPZ	*	86,001	307	41	68
*JA1IE	*	65,992	198	64	82
*JE1COB	*	62,050	201	62	84
*JG1TVK	*	61,110	160	67	108
*JJ1JGI	*	59,400	182	74	106
*JI1HFJ	*	55,693	269	30	53
*JF1FEV	*	54,684	158	58	89
*JJ1IVX	*	52,030	161	44	77
*JA1WHG	*	49,298	195	70	87
*JA1HG	*	44,286	145	57	65
*JO1QZI	*	43,967	157	47	86
*JG3NKP/1	*	43,120	142	38	74
*JA1HFY	*	41,171	160	61	74
*JA1XRH	*	32,032	113	54	58
*JH1ECF	*	30,744	147	47	75
*JM1KNI	*	29,516	127	41	53
*JA1RRA	*	27,600	117	38	54
*JH1WFK	*	26,106	93	49	65
*JE1JAC	*	21,714	106	39	55
*JA1EMQ	*	21,344	99	41	51
*JH1OLB	*	19,688	104	38	54
*JA1BBA	*	18,480	91	39	45
*JH1MTR	*	17,595	81	39	46
*JR1UMO	*	17,298	78	42	51
*JA1AZS	*	11,455	95	34	45
*JI1CUP	*	7,788	58	30	36
*JA1GYO	*	7,085	51	29	36
*JA1WQX	*	3,692	43	25	27
*JA1BFN	*	3,162	126	35	37
*7K2KJX	*	2,982	29	19	23
*JG1FGL	*	2,390	38	18	26
*JA1FRQ	*	992	46	29	33
*JP1IOI	*	518	61	33	41
*JR1WYV	*	100	34	17	17
***JHØSDA/1**	**28**	**94,484**	**455**	**29**	**50**
***JA1NLX**	*****	**61,698**	**303**	**26**	**52**
*JH1TXG	*	35,360	198	27	53
*7K2PBB	*	12,685	90	23	36
*JG1UKW	*	7,525	70	16	27
*JA1AAT	*	3,804	42	17	26
***JA1BPA**	**21**	**258,400**	**756**	**35**	**101**
***7K4XNN**	*****	**142,252**	**587**	**32**	**74**
*JS1IFK	*	87,465	349	31	74
*JJ1GQH	*	41,888	224	23	54
*JA1EJD	*	26,550	152	26	49
*JA1EM	*	14,788	112	21	38
*7M2ALP	*	14,364	99	23	40
*JH1DJD	*	11,730	110	24	45
*JH1BUB	*	10,340	42	20	45
*JI1BBN	*	7,865	60	21	34
*JO1WIZ	*	6,076	64	20	25
*JH8PHT/1	*	5,777	58	23	30
*JA1PUK	*	2,176	34	13	21
*JA1IWP	14	2,070	44	18	27
*JA1IZ	7	1,674	32	12	19
*JL1GJE	*	989	18	10	13
***JH1APZ**	**3.5**	**9,648**	**75**	**24**	**43**
*JA1VVH	*	552	21	10	13
***JE1TSD**	**1.8**	**528**	**15**	**9**	**11**
*JE1SPY	*	306	24	8	9
JA2FSM	**A**	**55,044**	**187**	**58**	**74**
JF2FIU	*	306	12	5	4
JF2ION	**28**	**149,856**	**582**	**36**	**76**
JA2XCR	**21**	**96,768**	**371**	**32**	**75**
JF2BDK	**14**	**151,800**	**429**	**34**	**98**
JE2HVC	**7**	**75,511**	**333**	**30**	**76**
JH2FXK	**1.8**	**1,728**	**32**	**10**	**17**
***JI2KVW**	**A**	**1,082,316**	**1128**	**135**	**269**
***JH2NWP**	*****	**628,290**	**750**	**115**	**236**
*JA2CUS	*	275,340	461	97	163
*JA2JTN	*	273,675	528	76	129
*JA2CXF	*	269,360	421	90	170
*JA2VZL	*	190,680	347	88	139
*JA2OVP	*	130,047	246	78	123
*JA2UJ	*	113,544	256	62	104
*JA2PFO	*	55,552	190	53	75
*JA2KPW	*	54,896	166	66	80
*JA2KCY	*	38,989	148	49	78
*JH2OMM	*	34,454	131	43	68
*JA2MZ	*	21,622	117	35	46
*JQ2EHD	*	19,902	84	52	55
*JH2XTV	*	10,864	63	36	44
*JQ1AHZ/2	*	10,440	77	28	44
*JE2HLU	*	3,264	32	23	28
*JJ2SHW	*	42	3	3	3
***JA2IU**	**28**	**73,455**	**346**	**31**	**63**
*JG2KKG	*	37,730	288	25	45
*JG2TKH	*	24,131	177	21	38
*JR2TMB	*	9,576	88	18	24
*JR2NTC	*	1,482	28	9	17
***JA2KVB**	**21**	**141,384**	**407**	**34**	**95**
*JA2KKA	14	12,400	87	25	37
*JL2LPX	*	3,876	48	20	25
***JE2OTM**	**3.5**	**2,220**	**39**	**16**	**21**
*JM2RUV	*	1,304	13	21	27
JR3NZC	**A**	**794,080**	**1103**	**108**	**172**
JR3XEX	*	81,720	254	79	101
JG3WCZ	*	972	16	12	15
JA3XOG	**28**	**140,919**	**517**	**32**	**75**
JH3AIU	**21**	**564,166**	**1534**	**35**	**102**
JS3CTQ	**14**	**521,043**	**1217**	**36**	**123**
JL3SBE	7	26,240	134	26	54
***JF3GKE**	**A**	**1,107,488**	**1033**	**136**	**288**
***JG3LGD**	*****	**449,658**	**604**	**104**	**193**
*JH3CUL	*	336,384	482	100	188
*JA3PYC	*	245,784	367	103	163
*JL3SIK	*	233,920	355	94	178
*JK3GWT	*	104,976	393	30	78
*JJ3TBB	*	93,396	226	75	106
*JA3UWB	*	90,792	236	68	112
*JA3DAY	*	67,864	190	50	86
*JA3AVO	*	51,030	165	53	82
*JA3OOS	*	43,736	155	61	81
*JR3VFU	*	22,213	95	43	54
*JE3ECD	*	2,784	30	21	25
*JG3EHD	*	722	14	9	10
*JR3NDM	*	360	16	14	16
*JO3AGQ	*	100	71	29	33
***JF3BFS**	**28**	**116,316**	**462**	**33**	**75**
*JF3EBO	*	44,400	242	24	51
***JR3EOI**	**21**	**237,900**	**729**	**34**	**96**
*JQ3NSU/3	*	9,788	132	16	18
*JI3OQO	*	5,875	51	20	27
*JK3AHS	*	598	16	10	13
*JN3DSH	14	6,882	56	23	39
*JA3AYX	*	6,148	60	22	35
*JA3WEU	*	1,952	31	12	20
***JM3CRK**	**7**	**35,002**	**195**	**27**	**47**
*JI3LDN	*	2	1	1	1
*JA3GN	3.5	5,083	66	20	30
*JI3BFC	1.8	143	10	5	6
JA4YHX	**A**	**252,590**	**344**	**107**	**183**
					(OP: JA4CZM)
JA4ESR	*	199,739	407	87	142
JA4AQZ	**21**	**28,942**	**140**	**26**	**58**
***JH4UYB**	**A**	**2,506,875**	**2036**	**154**	**331**
*JM4WUZ	*	265,050	378	108	177
*JA4BAA	*	146,290	321	76	133
*JA4AQR	*	140,595	297	70	125
*JA4EZA	*	96,330	239	54	115
*JJ4PPK	*	34,629	132	48	77
***JA4ETH**	**28**	**31,920**	**175**	**25**	**55**
***JR4GPA**	**21**	**79,294**	**487**	**26**	**56**
*JJ4CDW	*	37,931	178	28	66
*JA4FRQ	*	2,130	17	27	63
*JR4FLW	14	14,742	100	23	58
*JR4ISK	*	42	3	3	3
*JE4MHL	7	6,426	56	18	33
JH5FXP	**A**	**4,617,976**	**3202**	**165**	**376**
JA5DQH	**21**	**741,960**	**1662**	**38**	**124**
JA5APU	*	128,310	588	30	75
JA5IP	7	8,974	83	17	32
***JA5DEU**	**A**	**143,616**	**288**	**78**	**126**
*JA5ENO	*	47,950	154	51	86
*JR5NMD	*	15,957	79	37	44
*JA5RB	*	3,042	33	17	22
*JG5DHX	14	3,636	44	18	18
***JA5ATN**	**7**	**37,599**	**194**	**29**	**54**
*JA5JGV	1.8	77	8	5	6
JA6GCE	**A**	**2,997,134**	**2322**	**157**	**357**
JA6VU	*	169,248	328	96	150
JA6WJL	**28**	**86,132**	**303**	**33**	**89**
JJ6WYS	14	15,549	88	26	47
***JA6SRB**	**A**	**382,627**	**516**	**114**	**215**
*JA6CYL	*	234,234	408	76	155
*JA6AKW	*	209,149	423	68	131
*JA6BWB/M	*	18,612	139	20	45
*JI6XJG	*	960	21	14	18
***JH6WHN**	**21**	**170,724**	**583**	**34**	**89**
*JJ6TWQ	*	18,821	123	21	46
*JA6QDU	*	14,706	102	22	35
*JJ6DGP	14	16,100	96	24	46
*JL6IPK	7	7,149	74	19	30
JA7IC	**A**	**1,161,043**	**1131**	**132**	**271**
JA7MJ	*	500,721	598	121	226
JA7JHT	*	38,726	121	63	71
JA7OWD	28	10,643	70	25	40
JA7NVF	**14**	**266,224**	**963**	**32**	**80**
JA7COI	*	31,374	156	28	55
JH7XGN	**7**	**244,140**	**747**	**34**	**96**
JH7XMO	3.5	3,344	41	19	25
***JF7PHE**	**A**	**436,489**	**744**	**92**	**159**
*JK1AJX/7	*	410,023	595	99	172
*JA7DNO	*	261,640	428	91	157
*JA7YQV	*	78,613	251	43	84
					(OP: JQ1UKK)
*JR7UOL	*	37,629	129	45	68
*JN7OJA	*	26,504	118	42	57
*JF7GDF	*	15,841	96	34	39
*JRØEFE/7	*	3,403	31	19	22
*JL7IFR	*	2,250	41	21	24
*JA7ARW	*	1,364	25	14	17
*JA7AXP	28	92	7	3	4
*JA3LKE/7	7	3,108	44	14	14
JA8CJY	**28**	**55,680**	**225**	**32**	**64**
JA8LN	21	26,472	141	29	54
***JA8AJE**	**A**	**266,444**	**434**	**92**	**144**
*JH8BKP	*	78,540	205	64	101
*JK8NLB	*	26,883	103	45	58
*JH8DHV	*	2,808	63	9	9
***JL8AQH**	**21**	**48,646**	**233**	**30**	**66**
*JA8RII	*	3,774	47	17	21
JA9JFO	**A**	**238,235**	**373**	**100**	**165**
JA9XBW	**21**	**111,825**	**388**	**31**	**74**
JA9CWJ	**14**	**195,130**	**570**	**33**	**97**
***JR9NVB**	**7**	**25,827**	**136**	**29**	**57**
JHØFUW	**28**	**214,020**	**702**	**33**	**83**
JEØVJV	3.5	10,672	76	25	47
***JAØBMS**	**A**	**140,080**	**329**	**67**	**103**
*JAØFVU	*	115,872	231	85	128
*JAØXZD	*	46,644	157	56	82
*JHØSGG	*	27,166	121	42	52
*JHØIXE	*	15,744	80	33	49
*JAØDOW	*	13,860	86	31	46
*JAØRCK	*	4,914	33	24	30
*JAØUMV	28	15,105	117	19	34
*JAØGZ	*	3,178	41	17	22
***JHØEPI**	**14**	**93,586**	**409**	**28**	**72**
*JHØNEC	7	4,746	57	16	26
KAZAKHSTAN					
UNØL	**A**	**1,097,235**	**1293**	**76**	**257**
UN4L	**21**	**542,844**	**1443**	**35**	**118**
UN6GN	*	386,176	1212	32	96
UN9LY	*	306,000	987	33	103
UN6LN	**14**	**319,599**	**994**	**30**	**103**
***UN7MO**	**A**	**2,735,888**	**2602**	**95**	**309**
*UP6P	*	1,323,540	1427	111	319
					(OP: UN6P)
*UN7JX	*	931,588	1226	80	263
*UN4PG	*	680,867	806	80	251
*UN7CZ	*	463,526	723	78	215
***UN5J**	**28**	**182,004**	**732**	**27**	**89**
***UN4PD**	**21**	**134,048**	**462**	**27**	**91**
***UO1E**	**14**	**93,111**	**397**	**29**	**79**
					(OP: UN7EX)
***UN7SW**	**7**	**89,094**	**369**	**20**	**73**
KOREA					
HL5UOG	**A**	**273,713**	**478**	**108**	**179**
HL3AMO	28	8,151	71	22	35
***HL2FDW**	**A**	**525,357**	**1072**	**102**	**177**
*DS5KJR	*	177,232	605	84	128
*DS1CCU	*	135,424	611	83	101
*HL5AP	*	63,596	202	58	99
*D88DX	*	33,120	280	43	53
					(OP: DS4NMJ)
*HL2SQQ	*	27,911	113	48	65
*HL9TY	*	10,710	89	32	53
***HL1EJT**	**7**	**51,765**	**354**	**26**	**61**
KUWAIT					
9K2HN	**7**	**150,600**	**494**	**30**	**90**
KYRGYZSTAN					
EX9A	**A**	**6,660,511**	**4794**	**149**	**462**
					(OP: UA3DPX)
EX2A	*	1,455,739	1745	91	288
EX2X	**14**	**294,462**	**917**	**33**	**100**
MONGOLIA					
JT1CO	**A**	**2,461,473**	**2761**	**120**	**319**
JT1BV	*	704,352	1196	106	242
JT1CS	**21**	**227,244**	**1098**	**31**	**85**
JT1CO	**7**	**49,136**	**400**	**21**	**53**
JT1JA	**3.5**	**9,456**	**133**	**18**	**30**
					(OP: JT1BL)
JT1C	**1.8**	**7,582**	**184**	**13**	**21**
					(OP: JT1CO)
*JT2KAA	A	100	130	28	41
***JT1DA**	**21**	**36,720**	**365**	**22**	**50**
***JT1BJ**	**14**	**39,512**	**687**	**28**	**60**
OMAN					
A45XR	**A**	**10,837,434**	**5886**	**161**	**520**
PAKISTAN					
***AP2ARS**	**A**	**42,105**	**190**	**29**	**76**
SAUDI ARABIA					
HZ1AB	**21**	**966,095**	**2240**	**40**	**127**
					(OP: SMØCXU)
SINGAPORE					
9V1YC	**7**	**265,986**	**1073**	**32**	**94**
***9V1GO**	**3.5**	**24,735**	**213**	**27**	**58**
SRI LANKA					
*4S7NI	14	450	11	7	11
TAIWAN					
***BW2/JHØKHR**	**A**	**250,594**	**789**	**78**	**136**
***BW4/UA3VCS**	**21**	**333,168**	**1237**	**34**	**98**
***BX3/DJ3KR**	**1.8**	**5,700**	**168**	**13**	**25**
TAJIKISTAN					
EY7AF	**14**	**651,840**	**1736**	**36**	**124**
EY8MM	**3.5**	**376,406**	**1229**	**32**	**102**
***EY7AB**	**21**	**114,018**	**588**	**21**	**72**
THAILAND					
HSØZDY	**21**	**77,688**	**303**	**32**	**85**
HSØGBI	**3.5**	**8,586**	**106**	**17**	**37**
***E2ØHHK**	**A**	**12,495**	**67**	**34**	**51**
TURKMENISTAN					
***EZ8CW**	**28**	**2,117**	**53**	**8**	**14**
UK BASES ON CYPRUS					
ZC4T	**A**	**552,891**	**798**	**78**	**215**
					(OP: ZC4CW)
UZBEKISTAN					
UK/JI2MED	**A**	**737,832**	**1105**	**76**	**208**
***UK9AA**	**A**	**585,397**	**1353**	**35**	**116**
VIETNAM					
XV2M	**21**	**277,704**	**1441**	**32**	**82**
WEST MALAYSIA					
9M2/G4ZFE	**A**	**2,285,645**	**2530**	**120**	**299**
***9M2TO**	**A**	**684,450**	**1562**	**103**	**248**

EUROPE

AUSTRIA					
OE2G	**A**	**1,754,368**	**2282**	**108**	**340**
					(OP: OE2BZL)
OE1JNB	*	194,677	632	52	151
OE5OHO	*	159,367	494	50	119
OE1TKW	*	16,198	161	21	70
OE/S59W	**28**	**166,611**	**949**	**33**	**78**
OE4A	**21**	**678,640**	**1955**	**39**	**131**
					(OP: OE1EMS)
OE3GSA	**14**	**250,350**	**984**	**35**	**115**
***OE5CYL**	**A**	**60,600**	**265**	**40**	**110**
*OE3JIS	*	14,880	169	40	84
***OE5CWL**	**3.5**	**82,152**	**1139**	**11**	**61**
AZORES					
***CU2F**	**14**	**781,600**	**2426**	**37**	**123**
					(OP: SM4DHF)
BALEARIC ISLANDS					
*EA6AZ	A	3,220	45	14	32
BELARUS					
EW1CQ	**A**	**988,754**	**1248**	**106**	**336**
EU1PA	*****	**814,023**	**1326**	**105**	**308**
EU4LY	*	422,096	1136	62	234
EU4CQ	*	78,996	347	58	169
EU7SA	*	16,650	67	36	54
EU4AA	**28**	**122,031**	**370**	**37**	**112**
EW8EW	**21**	**572,808**	**1713**	**39**	**135**
EU1DX	**14**	**486,166**	**1700**	**38**	**120**
EW6AF	*	157,626	862	31	95
EW8DX	**3.5**	**56,680**	**870**	**10**	**55**
EU6EU	**1.8**	**83,130**	**951**	**18**	**67**
***EW3LN**	**A**	**140,067**	**436**	**48**	**149**
*EV6Z	*	56,723	169	51	80
*EW1EA	*	43,520	219	33	95
*EW2EG	*	6,915	105	18	49
***EW6AW**	**28**	**53,074**	**201**	**34**	**85**
***EW2AA**	**21**	**255,996**	**721**	**36**	**120**
***EV6M**	**14**	**34,020**	**296**	**20**	**61**
***EW7LO**	**7**	**132,928**	**808**	**28**	**96**
*EU1MM	*	40,656	381	19	58
***EW6WF**	**1.8**	**7,138**	**154**	**8**	**35**
BELGIUM					
OT3R	**A**	**508,379**	**1151**	**69**	**194**
ON6AA	*	356,832	951	50	174
ON4WW	**1.8**	**89,280**	**858**	**20**	**76**
***ON4ON**	**A**	**516,026**	**850**	**104**	**330**
*ON4XG	*	365,175	659	78	243
*ON4KJ	*	257,054	632	78	223
*ON6LY	*	253,936	616	71	198
*ON6WP	*	165,375	538	47	128
*ON4LDP	*	118,482	379	54	132
*ON4KVA	*	15,312	130	20	46
*ON4CGY	28	20,088	93	31	62
*ON6LO	*	11,357	129	16	25
***ON5CW**	**21**	**102,502**	**562**	**24**	**78**
***ON5YR**	**14**	**57,681**	**399**	**21**	**66**
*ON6TJ	*	25,428	210	16	62
*ON7VZ	*	2,220	60	7	30
BOSNIA-HERZEGOVINA					
T94NO	**28**	**398,250**	**1443**	**33**	**92**
T96Q	**7**	**803,544**	**3046**	**37**	**131**
*T94LW	A	32,424	323	42	126
*T97J	*	2,728	101	5	26
***T91EDV**	**28**	**55,900**	**289**	**28**	**72**
***T94OM**	**21**	**157,185**	**815**	**25**	**80**
***T94FC**	**14**	**252,450**	**1154**	**33**	**102**
*T98R	*	68,200	536	25	75
***T97M**	**7**	**266,616**	**1283**	**31**	**95**
***T99Z**	**1.8**	**19,942**	**426**	**7**	**52**
BULGARIA					
LZ1BJ	**A**	**1,649,000**	**2118**	**105**	**329**
LZ4UU	*****	**1,473,584**	**1984**	**107**	**339**
LZ3NY	*	748,845	973	110	295
LZ2SX	*	455,544	1004	76	220
LZ1RW	*	235,422	609	70	191
LZ5ZI	*	174,020	425	73	153
LZ4A	*	158,193	489	77	202
					(OP: LZ2EV)
LZ3YV	*	1,320	53	13	27
LZ9X	**28**	**260,546**	**872**	**36**	**107**
LZ2VP	21	30,342	111	23	62
LZ3UA	**14**	**250,050**	**1108**	**34**	**116**
LZ2PL	*	16,940	153	21	49
LZ1YG	*	1,377	32	7	10
LZ5W	**7**	**581,440**	**1947**	**37**	**121**
					(OP: LZ1BP)
***LZ9R**	**A**	**1,852,422**	**1984**	**126**	**435**
					(OP: LZ3YY)
*LZ2UZ	*	928,200	1361	103	339
*LZ4GL	*	282,753	586	69	198
*LZ1QV	*	243,085	430	79	226
*LZ1FJ	*	133,672	491	45	151
*LZ1MC	*	90,312	254	56	103
*LZ4WX	*	86,328	214	65	153
*LZ2A	*	81,291	254	53	94
*LZ1GU	*	21,850	76	44	71
*LZ1ZM	*	20,774	126	31	63
*LZ4BU	*	12,000	65	33	47
*LZ3SM	*	1,148	15	13	15
***LZ1NG**	**28**	**224,664**	**755**	**34**	**98**
*LZ2GS	*	8,509	74	19	32
***LZ2JA**	**21**	**111,564**	**563**	**23**	**85**
***LZ2TU**	**14**	**353,913**	**1820**	**33**	**100**
*LZ6W	*	244,416	1018	37	115
*LZ1CW	*	66,127	394	25	90
*LZ2TW	*	55,909	136	18	75
*LZ1EP	*	27,747	253	20	67
***LZ4RV**	**7**	**42,186**	**397**	**17**	**57**
*LZ1FW	3.5	1,125	38	6	19
***LZ1DQ**	**1.8**	**4,173**	**129**	**7**	**32**
CRETE					
***SVØXAI/9**	**28**	**61,440**	**589**	**18**	**46**
CORSICA					
TK9A	**A**	**5,253,822**	**4970**	**125**	**449**
					(OP: SS1TA)
CROATIA					
***9A5I**	**A**	**839,160**	**1113**	**101**	**304**
*9A2NO	*	722,235	901	103	342
*9A5CC	*	24	19	10	14
***9A3VM**	**28**	**255,018**	**1006**	**29**	**85**
***9A7D**	**21**	**324,714**	**1037**	**37**	**101**
					(OP: 9A2SD)
***9A4RV**	**14**

***OK2HZ**	**28**	**123,057**	**400**	**34**	**87**	
*OK1ES	*	77,028	288	35	96	
*OK1AES	*	68,582	265	30	76	
*OK1DJS	*	6,517	118	18	31	
*OK1DKM	*	2,905	60	16	20	
***OK2NN**	**21**	**212,784**	**662**	**36**	**120**	
***OK2PVF**	*****	**212,761**	**873**	**29**	**108**	
*OK1TD	*	100,233	343	30	99	
*OK1TVL	*	100	22	7	9	
***OK1FHL**	**14**	**145,348**	**749**	**30**	**86**	
*OK2PTZ	*	126,929	639	29	92	
*OK2TBC	*	102,796	481	31	93	
*OK1DSA	*	72,320	358	28	85	
*OK1MKI	*	50,578	396	23	79	
*OK1MMN	*	41,310	272	21	69	
***OK1FFU**	**7**	**380,912**	**1644**	**32**	**101**	
***OL5T**	*****	**261,528**	**1256**	**30**	**106**	
			(OP: OK1DCF)			
*OK2BYW	*	146,042	600	34	103	
*OK2HI	*	117,522	584	30	99	
*OK1FCA	*	99,684	539	22	86	
*OK1GS	*	68,887	490	17	74	
*OK1CRM	*	25,066	249	19	64	
***OK1FHI**	**3.5**	**86,686**	**785**	**17**	**72**	
*OK1FOG	*	51,832	566	14	62	
*OK1DLD	*	32,361	413	13	54	
*OK2PBG	*	17,968	176	14	62	
*OK2HWP	*	8,140	178	6	38	
***OK1YO**	**1.8**	**15,573**	**295**	**8**	**50**	
***OK1JOK**	*****	**15,476**	**315**	**6**	**47**	
*OK1FLC	*	14,711	325	5	42	
*OK1DOY	*	10,534	234	6	40	
*OK2BDF	*	7,896	164	5	42	
		DENMARK				
OZ1LO	**A**	**3,423,168**	**3277**	**133**	**433**	
OZ1AA	*****	**3,108,773**	**3000**	**117**	**410**	
OZ4KG	*	252,909	596	83	240	
***OZ1CBW**	**A**	**387,744**	**721**	**82**	**254**	
*OZ1BMA	*	338,800	675	71	204	
*OZ4RT	*	306,356	534	72	206	
*OZ5UR	*	200,910	479	55	167	
*OZ4FF	*	131,468	332	63	191	
*OZ7NB	*	80,217	304	41	601	
*OZ1HX	*	61,594	164	66	140	
*OZ1DUG	*	29,512	227	28	91	
*OZ6EI	*	22,869	158	40	81	
*OZ7AEI	*	7,650	99	32	53	
*OZØJ	28	4,108	73	11	15	
*OZ7GN	3.5	3,977	86	7	34	
		DODECANESE				
SV5RDS	**A**	**250,452**	**1631**	**22**	**86**	
			(OP: SV1DKL)			
***J45KLN**	**A**	**480,872**	**1439**	**57**	**191**	
			(OP: SM8CMH)			
		ENGLAND				
G3TXF	**A**	**4,582,342**	**3526**	**139**	**459**	
G4BUO	*****	**2,747,844**	**2228**	**125**	**389**	
G4IIY	*	2,122,728	2422	108	374	
G8D	*	1,789,235	2150	106	363	
			(OP: G3SJJ)			
G3UFY	*	1,768,425	1874	106	369	
G4BJM	*	1,509,320	1908	102	286	
G3LZQ	*	1,342,856	1483	104	354	
GØWKW	*	912,912	1758	76	228	
M8C	*	796,656	1498	83	253	
			(OP: G4DBL)			
G3KWK	*	189,584	532	75	197	
G2AFV	*	127,792	341	58	138	
G3NAS	*	100,566	239	72	150	
GØMBQ	*	61,963	281	41	90	
G3GLL	**28**	**42,328**	**199**	**27**	**61**	
M7Z	**14**	**783,188**	**2502**	**36**	**130**	
			(OP: G3VHB)			
G3AB	*	733,374	2304	37	125	
GØIVZ	*	718,470	2352	36	126	
M3C	*	94,963	679	24	73	
			(OP: GØVQR)			
MØDXR	**7**	**382,075**	**1823**	**35**	**110**	
G3NKS	*	37,600	222	22	72	
G3PJT	**1.8**	**33,534**	**527**	**13**	**56**	
MØAJT	*	8,556	199	7	39	
***G3WGV**	**A**	**1,560,432**	**1855**	**104**	**360**	
***G3KKQ**	*****	**907,255**	**1221**	**94**	**327**	
*G3ZRJ	*	774,595	1092	96	299	
*G4KFT	*	770,991	1018	92	281	
*G3RSD	*	496,872	898	76	233	
*G3KKP	*	467,748	739	73	211	
*GØUKX	*	370,225	730	61	190	
*G4DDX	*	328,032	676	72	196	
*M5FUN	*	219,551	589	61	180	
*G3BFP	*	206,535	394	68	177	
*G4OWT	*	175,436	381	76	168	
*G4IXF	*	122,414	467	46	148	
*GØMRH	*	80,640	387	42	118	
*G4SLE	*	76,000	314	51	139	
*G3WRR	*	69,938	210	57	130	
*MØZAK	*	33,810	174	33	82	
*G7ORR	*	22,338	169	25	77	
*M5RIC	*	22,185	156	26	61	
*G3HKO	*	8,295	66	29	50	
***GØRDO**	**28**	**47,775**	**289**	**22**	**53**	
*GØORH	*	46,782	405	19	27	
*G4PCI	*	3,596	49	14	17	
***GØLZL**	**21**	**153,794**	**561**	**38**	**101**	
***G3VYI**	**14**	**22,842**	**152**	**28**	**61**	
***M4K**	**7**	**357,022**	**1997**	**31**	**106**	
			(OP: MØBEW)			
*G3JJZ	*	26,622	181	23	64	
		ESTONIA				
ES5TV	**A**	**4,073,073**	**3839**	**175**	**524**	
ES1A	*****	**3,473,331**	**3140**	**154**	**545**	
			(OP: ES1AJ)			
ES1QD	**28**	**19,578**	**109**	**26**	**52**	
ES2U	**1.8**	**71,422**	**781**	**17**	**65**	
			(OP: ES2DJ)			
***ES4MM**	**A**	**336,375**	**502**	**94**	**251**	
*ES7FU	*	231,071	585	58	211	
*ES4RD	*	44,936	296	31	106	
*ES6KW	*	27,636	213	32	109	
*ES6CO	*	15,276	142	22	54	
***ES2EZ**	**7**	**98,280**	**590**	**27**	**90**	
***ES1TM**	**3.5**	**18,044**	**350**	**7**	**45**	
		EUROPEAN RUSSIA				
RW1ZA	**A**	**3,340,653**	**2903**	**136**	**391**	
RA3TT	*****	**1,833,120**	**2278**	**118**	**418**	
RW3GU	*****	**1,725,552**	**1669**	**131**	**421**	
UA1QV	*	1,631,154	1980	114	383	
RZ4FA	*	1,467,628	1629	132	426	
UA4LY	*	872,613	974	138	429	
RK3DK	*	862,263	1444	106	341	
RA3FD	*	796,779	1318	91	306	
RZ3AV	*	717,312	1046	103	364	
RX3AEX	*	713,370	1284	90	305	
UA4SO	*	681,696	1044	98	334	
UA3LUE	*	677,810	984	99	322	
RA3SL	*	636,888	1223	98	310	
RX3OM	*	590,969	1015	89	294	
RN6FA	*	496,398	960	88	283	
UA4SU	*	481,342	767	95	291	
RA3XO	*	415,242	544	108	283	
RV1CC	*	265,696	460	99	205	
RA3XR	*	242,200	535	72	208	
RK3AZ	*	212,520	365	84	196	
UA3ICK	*	173,271	537	47	176	
RV6YB	*	129,554	396	51	160	
UA1AKE	*	119,210	201	78	184	
RA1WJ	*	119,184	525	48	160	
RX4HX	*	96,073	304	53	138	
RA4HVX	*	16,875	150	43	92	
UA3TU	*	16,544	133	21	67	
UA3MDX	*	9,114	64	18	44	
UA4COM	*	1,260	19	17	18	
RW3SK	**28**	**23,908**	**144**	**24**	**52**	
UA3DEE	**21**	**155,664**	**545**	**33**	**108**	
RW4HS	*	113,190	609	27	83	
UA6LP	*	10,716	70	18	39	
RT3A	**14**	**454,181**	**1501**	**37**	**124**	
			(OP: RU3AA)			
UA4LCH	*	444,600	1398	39	132	
RU6LG	*	170,324	724	37	117	
UA6LAM	*	56,465	355	30	85	
UA3TCJ	**7**	**372,939**	**1310**	**36**	**111**	
RW3WWW	*	189,745	876	32	105	
			(OP: RA3WJ)			
RW6CF	*	186,186	923	32	111	
RW1ZZ	*	126,047	569	31	97	
UA1OMS	**3.5**	**162,396**	**1007**	**29**	**88**	
RA6LBS	*	80,460	592	27	81	
UA3PW	*	57,436	522	17	66	
RN3DY	*	54,096	530	17	67	
RA3WDK	*	49,977	485	19	62	
RU4CO	*	16,124	260	12	45	
RU3ZV	*	15,015	242	10	45	
RZ3DX	**1.8**	**27,654**	**401**	**12**	**54**	
UA6JFG	*	10,850	207	9	41	
***UA4FER**	**A**	**2,487,706**	**2547**	**138**	**449**	
***UA1OMZ**	*****	**1,235,224**	**1947**	**102**	**370**	
***RA3AF**	*****	**1,182,750**	**1516**	**116**	**382**	
*RN4WA	*	1,143,304	1746	111	371	
*UA3ABJ	*	1,128,105	1478	116	357	
*RZ4AG	*	1,044,576	1239	118	350	
*RV3LO	*	868,014	1192	112	386	
*UA3SAQ	*	789,435	1105	109	368	
*RW1AI	*	754,719	1115	98	335	
*RU3FF	*	730,236	1211	92	311	
*RA4HW	*	691,467	1335	93	306	
*RX3RZ	*	665,873	1078	93	298	
*RW3AX	*	615,864	985	89	313	
*RU4WE	*	583,500	1168	79	296	
*RV3QX	*	583,440	1077	87	287	
*UA3LEO	*	577,830	965	90	284	
*RA3AUM	*	557,370	992	87	243	
*UA4FEN	*	522,849	965	89	308	
*RU3HD	*	509,206	874	95	287	
*RV3FI	*	498,800	998	74	270	
*RN4SS	*	487,044	1276	72	254	
*UA1ZZ	*	485,929	923	92	285	
*RU3DM	*	477,848	720	99	293	
*RA3UT	*	468,114	829	94	272	
*RA3UAG	*	446,430	852	78	267	
*RA4AOR	*	432,485	984	69	266	
*UA4AN	*	406,644	837	74	208	
*UA3AMZ	*	398,496	779	83	253	
*UA4WLI	*	359,388	797	66	232	
*UA1OAM	*	358,020	769	73	233	
*UA3DMO	*	333,970	582	92	275	
*RD4WA	*	331,780	899	68	245	
*RA3NN	*	330,030	723	75	267	
*RN3FA	*	308,700	650	88	212	
*RV3DND	*	307,764	666	73	236	
*RA4FJV	*	295,785	629	83	230	
*UA6AK	*	295,074	562	80	258	
*RU3XB	*	294,576	660	77	227	
*RX3AGQ	*	222,250	555	58	196	
*UA3VLO	*	197,508	367	69	233	
*RA6MS	*	161,210	527	51	184	
*RZ3DA	*	153,729	306	88	191	
*RA6HR	*	145,360	438	61	169	
*RW6AH	*	144,966	484	53	169	
*RA1QX	*	144,752	446	50	168	
*UA4QK	*	126,023	356	65	168	
*UA4CC	*	122,092	241	83	150	
*RV3LQ	*	121,200	418	47	153	
*UA3AKI	*	119,637	310	55	156	
*RA3UF	*	117,507	303	83	216	
*RZ1AZ	*	113,491	359	53	164	
*RA3XAU	*	112,464	441	49	164	
*RV3DAK	*	106,860	349	45	150	
*RV4AQ	*	105,424	445	38	138	
*RU3WR	*	105,078	397	52	159	
*UA6HON	*	99,904	314	60	164	
*RK3DH	*	97,364	174	91	150	
*UA3LEL	*	95,200	249	54	116	
*RW3SU	*	94,176	231	65	151	
*RA3BB	*	87,156	296	55	107	
*RV3ZN	*	85,470	396	37	117	
*RX3MM	*	77,212	233	52	142	
*RD3AN	*	76,092	264	50	154	
*RW4AD	*	74,847	351	41	142	
*RA3NZ	*	68,040	255	42	126	
*RZ3OV	*	65,188	205	55	117	
*UA4ANZ	*	62,799	230	46	127	
*RA3MB	*	48,129	211	53	130	
*RU6CO	*	47,872	180	58	129	
*RD3DK	*	47,476	191	49	117	
*RZ4AO	*	46,814	139	61	117	
*UA3QU	*	43,120	191	43	111	
*RA3TLA	*	40,524	290	31	101	
*UA4ACP	*	40,166	223	36	97	
*UA3LBE	*	33,495	183	37	95	
*RK6CM	*	32,643	191	30	87	
*UA3EAY	*	31,878	189	30	96	
*RW3TA	*	31,857	170	31	80	
*RK3DTI	*	27,632	148	30	58	
*UA3DOM	*	21,629	128	29	75	
*UA3ABW	*	16,732	132	21	68	
*UA3UBT	*	15,946	123	33	86	
*RV3YR	*	15,930	111	25	65	
*UA6ATG	*	11,840	77	30	50	
*RA3XI	*	10,695	128	25	68	
*UA1NDX	*	7,670	58	26	33	
*RA1AFT	*	6,785	79	13	46	
*RN3AX	*	6,241	51	28	51	
*UA1ATZ	*	5,487	79	16	43	
*RA3XP	*	5,280	95	10	38	
*RU3GF	*	4,698	45	17	37	
*UA9QCP/3	*	2,880	37	18	30	
*RA6LAR	*	540	52	16	38	
***RU4SS**	**28**	**102,240**	**588**	**30**	**90**	
*RW3PN	*	28,454	176	24	58	
*RZ6HF	*	27,306	151	25	57	
*RA3XA	*	5,320	52	15	41	
***RV3ACA**	**21**	**282,532**	**1040**	**32**	**116**	
***RA3AN**	*****	**241,626**	**882**	**34**	**120**	
*RA3XM	*	218,307	775	35	124	
*RN1TN	*	197,580	952	35	113	
*RW4FX	*	106,272	446	32	91	
*RW4PY	*	31,416	267	21	67	
*UA4FRL	*	28,490	218	21	53	
*UA3WW	*	23,850	212	24	66	
*RV3PN	*	22,908	194	15	57	
*RW4LQ	*	9,296	63	22	34	
*RA4NDT	*	598	26	7	16	
***RW3XZ**	**14**	**102,600**	**610**	**29**	**91**	
*RA3OU	*	46,095	276	25	80	
*UA3URD	*	38,310	530	21	67	
*UA1ONG	*	29,382	213	23	60	
*RA1OHL	*	15,600	121	17	58	
*UA4NU	*	8,466	78	16	35	
*RK3WWA	*	4,173	71	13	26	
			(OP: RA3WDK)			
*RK3WXZ	*	812	43	7	21	
*UA4SBZ	*	49	10	3	4	
***RW3GB**	**7**	**275,132**	**1351**	**33**	**110**	
*UA3MM	*	171,831	812	29	98	
*RU6FA	*	121,968	628	31	95	
*RW6BN	*	46,360	353	20	75	
*UA3RF	*	15,410	177	15	52	
***UA6AAY**	**3.5**	**73,810**	**604**	**25**	**85**	
*UA1ANA	*	49,308	498	15	69	
*UA3WU	*	31,536	357	12	60	
*RV6LSS	*	23,115	280	11	56	
*UA3LIZ	*	17,168	258	9	49	
*RW3WM	*	16,302	244	12	54	
*RV6LA	*	13,750	236	9	46	
*UA3DTT	*	7,379	127	9	38	
***RZ3VA**	**1.8**	**7,310**	**138**	**8**	**35**	
*RK6ATQ	*	3,610	71	8	30	
*RA4SD	*	3,060	85	7	29	
		EUROPEAN TURKEY				
*TA1EQ	14	5,082	168	9	33	
		FAROE ISLANDS				
OY1CT	**14**	**438,108**	**2109**	**31**	**101**	
*OY4M	A	3,129	40	11	21	
***OY3QN**	**21**	**185,328**	**1202**	**22**	**77**	
		FINLAND				
OH1F	**A**	**4,596,123**	**3578**	**143**	**466**	
			(OP: OH1MDR)			
OH6KN	*	2,280,604	2250	127	339	
OH1MM	*	2,108,818	2120	120	421	
OH3WS	*	925,775	985	112	363	
OH5NE	*	630,372	1121	88	305	
OH3JR	*	579,984	549	124	392	
OH1KF	*	359,103	470	107	316	
OH6XY	*	338,240	622	89	231	
OH2VZ	*	299,788	545	75	223	
OH2CK	*	201,995	332	93	262	
OH1BOI	*	36,288	142	38	70	
OH2BAH	**28**	**9,685**	**76**	**22**	**43**	
OH6AC	**21**	**850,510**	**2182**	**39**	**131**	
			(OP: OH6CS)			
OH3WW	*	615,162	1743	38	125	
OH2BP	*	336,922	1047	36	121	
			(OP: OH2PO)			
OH6XX	*	241,026	1002	35	104	
OH2XF	*	102,661	318	33	116	
OH8L	**14**	**590,259**	**2033**	**35**	**116**	
			(OP: OH8LQ)			
OH2BCD	*	9,856	184	19	45	
OH6K	**7**	**138,096**	**851**	**32**	**94**	
			(OP: OH6GLE)			
OH7UE	*	96,437	493	33	88	
OH2CV	*	95,436	589	24	75	
OH2BH	**3.5**	**403,662**	**1843**	**33**	**114**	
			(OP: OH1WZ)			
***OH4R**	**A**	**2,339,337**	**2575**	**124**	**409**	
			(OP: OH4JFN)			
***OH6OS**	*****	**1,595,069**	**1718**	**113**	**356**	
*OH4TY	*	729,656	1055	97	312	
*OH2VF	*	480,960	673	88	272	
*OH2NN	*	420,732	578	92	285	
*OH2FS	*	397,062	539	92	295	
*OH2BPA	*	244,326	504	75	254	
*OH2LO	*	239,685	518	72	213	
*OH2BJ	*	238,670	544	68	222	
*OH5UFO	*	196,116	351	82	195	
*OH2LU	*	194,285	524	59	186	
*OH6RC	*	141,868	307	75	202	
*OH3VX	*	117,789	345	55	182	
*OH6DH	*	112,132	338	53	141	
*OH1EE	*	111,340	586	43	147	
*OH3HS	*	67,200	217	57	118	
*OH6MBQ	*	60,445	293	37	120	
*OH8SE	*	47,348	189	47	86	
*OH6KXL	*	37,350	207	44	106	
*OH2KM	*	20,315	144	23	62	
*OH2NIK	*	16,425	87	33	42	
*OH3IR	*	8,740	72	28	48	
*OH5DX	*	5,550	51	20	30	
*OH8SP	*	951	16	12	13	
*OH7TO	*	100	125	35	77	
*OH3R	28	1,440	18	13	17	
***OH5TS**	**14**	**286,416**	**880**	**36**	**120**	
***OH3KOK**	**7**	**9,231**	**126**	**13**	**48**	
*OH2DT	*	3,268	64	7	36	
***OH8VJ**	**1.8**	**3,780**	**99**	**8**	**37**	
		FRANCE				
TM6X	**A**	**5,295,600**	**4087**	**140**	**460**	
			(OP: F5VHY)			
F6IRF	*	1,937,376	1693	132	426	
F5RAB	*	799,582	1151	94	304	
F5AMH	*	623,702	923	93	301	
F5BBD	*	514,050	951	81	264	
F5VBU	*	300,370	810	64	181	
F5CQ	*	246,684	350	88	249	
TM2S	*	218,672	398	94	222	
			(OP: F5PED)			
F5YJ	*	200,430	486	64	191	
F6CXJ	*	5,310	82	16	43	
F5RZJ	**28**	**362,368**	**1223**	**37**	**112**	
F5UT	*	303,576	1011	34	105	
F6ARC	**7**	**931,552**	**2653**	**39**	**133**	
TM4Q	*	303,924	1955	28	101	
			(OP: F6FYA)			
F5OIH	*	197,104	970	30	97	
F5NBX	*	179,280	1144	27	81	
F6CWA	**1.8**	**27,974**	**390**	**13**	**58**	
***F5PHW**	**A**	**1,062,584**	**1412**	**98**	**321**	
***F6FTB**	*****	**988,974**	**1215**	**101**	**322**	
*F5TNI	*	718,570	1273	96	301	
*F5UKL	*	712,115	1130	97	268	
*F5NQL	*	694,056	1350	81	282	
*F5OF	*	521,855	807	89	216	
*F5ICC	*	506,168	818	80	234	
*F5SGI	*	332,478	569	72	190	
*F5CBQ	*	286,561	798	59	180	
*F5UMP	*	225,216	669	67	205	
*F5OZC	*	210,444	485	66	162	
*F5JOT	*	199,424	545	61	195	
*F5UL	*	197,379	492	67	174	
*F6DZD	*	144,117	391	54	147	
*F5NWK	*	122,570	330	59	147	
*F6ABI	*	91,314	320	50	128	
*F5INJ	*	90,048	383	45	123	
*F8DGF	*	86,697	332	47	124	
*F5MDW	*	41,400	200	37	101	
*F5NBK	*	28,421	173	33	64	
*F5IYQ	*	24,150	140	29	76	
*F5TJW	*	15,136	167	31	55	
*F5JDG	*	13,602	135	40	16	
***F8AKC**	**28**	**65,706**	**317**	**31**	**63**	
*F8AAN	*	29,640	308	19	33	
***F5JY**	**21**	**96,747**	**395**	**27**	**92**	
***F5LMJ**	**14**	**69,345**	**391**	**28**	**87**	
*F9DK	*	45,864	310	23	68	
*F8DFK	*	10,004	129	18	43	
***F5NGA**	**7**	**38,700**	**278**	**22**	**78**	
*F5UB	*	9,052	323	15	58	
***F8PDR**	**3.5**	**31,734**	**254**	**17**	**65**	
		GERMANY				
DJ5MW	**A**	**4,314,708**	**3492**	**140**	**481**	
DL3YBM	*****	**3,579,232**	**3144**	**137**	**455**	
DJ9OZ	*****	**2,774,793**	**2698**	**134**	**443**	
DL5AWI	*	2,737,260	1922	157	509	
DL2DX	*	1,624,754	1441	147	367	
DL5YM	*	1,123,650	1501	102	348	
DL2FDL	*	969,563	1877	109	312	
DL6UNF	*	957,528	1280	104	325	
DL1VDL	*	927,758	1134	108	334	
DL4WA	*	921,492	1197	104	292	
DL1DTC	*	899,574	998	119	375	
DL7JAN	*	796,274	1403	94	300	
DJ3WE	*	754,985	1326	94	313	
DKØMN	*	753,768	1238	82	260	
DF1DV	*	379,130	689	81	229	
DF8AA	*	373,190	702	79	256	
DL3FF	*	364,110	559	88	230	
DL3JPN	*	341,696	581	84	220	
DL8MUG	*	333,600	671	71	169	
DL1ZU	*	314,684	537	81	221	
DJ2IA	*	300,700	542	82	228	
DM3ML	*	218,560	472	82	238	
DM5JBN	*	213,408	445	70	177	
DJ9HX	*	213,346	298	98	245	
DL3YA	*	204,376	505	64	172	
DL6KO	*	196,282	425	78	173	
DL6AG	*	157,470	377	58	123	
DL5NO	*	102,180	282	59	136	
DL2QT	*	88,184	285	57	94	
DL6RBH	*	75,276	270	50	114	
DL2RTJ	*	64,240	332	35	111	
DL2HRN	*	43,152	197	43	81	
DL5ARM	*	32,670	196	31	79	
DJ1XT	*	19,952	97	30	56	
DF5AU	*	13,224	65	30	57	
DL1AZA	*	2,773	59	12	35	
DL3JRA	*	1,224	44	11	25	
DH7AMF	*	990	42	10	23	
DL7NS	**28**	**146,000**	**501**	**31**	**94**	
DJ7PT	*	75,190	340	29	74	
DH8VV	**21**	**365,223**	**1053**	**37**	**122**	
DJØIF	**14**	**280,140**	**1094**	**33**	**105**	
DL1TH	*	34,845	329	25	76	
DL9GFB	**7**	**120,834**	**622**	**27**	**99**	
DL6SN	*	21,225	150	18	57	
DL7ON	**3.5**	**284,900**	**1326**	**32**	**108**	
DJØIP	*	42,671	564	12	59	
			(OP: NJØIP)			
DF1HF	*	12,935	181	12	53	
DL5RBR	*	2,496	61	6	33	
DJØMDR	**1.8**	**70,664**	**857**	**19**	**69**	
DL7CX	*	54,108	745	14	67	
***DL9MRF**	**A**	**836,085**	**1275**	**93**	**308**	
***DL5KUD**	*****	**757,260**	**989**	**97**	**323**	
***DJØSP**	*****	**747,936**	**1606**	**86**	**208**	
*DL1MAJ	*	701,765	822	100	315	
*DF3OL	*	634,920	836	105	302	
*DF1IAQ	*	633,726	1075	81	261	
*DL8HCO	*	607,590	838	97	333	
*DL3ZAI	*	568,052	865	80	252	
*DL3NSM	*	564,408	986	84	267	
*DF9DM	*	559,935	867	78	267	
*DJ1CW	*	559,354	786	87	220	
*DL8UKE	*	546,642	871	94	288	
*DF6LQ	*	541,375	814	85	270	
*DJ6QZ	*	513,684	943	73	269	
*DL5YYM	*	511,506	755	92	270	
*DJ5AA	*	466,829	543	114	293	
*DL3HWM	*	455,598	688	76	275	
*DFØIT	*	444,080	917	67	238	
			(OP: DF6QC)			
*DL7UXG	*	443,212	804	80	228	
*DK7ZH	*	422,002	702	84	217	
*DL8YR	*	348,480	583	77	253	
*DL8ULO	*	335,415	696	73	222	
*DK8AX	*	329,490	528	85	230	
*DL8ZAJ	*	328,960	548	86	234	
*DJ3JD	*	319,976	538	82	214	
*DL3KWF	*	308,460	789	61	204	
*DL5YL	*	307,944	670	74	208	
*DL5JRA	*	307,736	718	73	213	
*DF7ZS	*	304,164	538	76	230	
*DL6ZNG	*	290,019	551	71	206	
*DK5JM	*	271,656	532	74	234	
*DL3APO	*	269,982	504

HA2MV	*	56,115	529	20	67
***HG7SM**	**A**	**1,974,442**	**3105**	**115**	**331**
			(OP: HA3MY)		
***HA6IAM**	*****	**553,125**	**981**	**94**	**281**
*HA8IB	*	360,000	597	76	212
*HA5X	*	330,601	691	73	196
*HA8CQ	*	97,734	369	44	138
*HA3OU	*	68,544	247	57	111
*HA1SN	*	51,450	237	45	102
*HA1VE	*	43,568	152	45	76
*HA8LC	*	38,170	191	32	78
***HG8I**	**21**	**442,156**	**1522**	**33**	**110**
*HA3NU	*	322,478	1018	36	122
*HA5ORA	*	21,107	178	20	44
***HA/OK2WH**	**7**	**51,591**	**501**	**16**	**71**
***HA8FW**	**3.5**	**93,390**	**800**	**25**	**85**
*HA1ZN	*	87,261	1065	19	68
***HA5BSW**	**1.8**	**23,100**	**440**	**8**	**52**
*HA8KW	*	19,245	349	8	54
		ICELAND			
TF3CW	**A**	**2,629,616**	**3297**	**105**	**341**
TF8GX	*	420,420	1054	69	191
***TF3GB**	**A**	**1,010,757**	**2131**	**66**	**215**
*TF3MM	*	33,500	194	30	70
		IRELAND			
EI4DW	**A**	**389,990**	**696**	**80**	**215**
EI2JD	*	92,685	305	51	134
***EI7JK**	**A**	**84,624**	**327**	**47**	**117**
*EI6HB	*	52,682	264	41	101
*EI9ES	*	7,820	110	12	56
***EI4CF**	**14**	**104,386**	**429**	**30**	**104**
		ITALY			
IK2WXV	**A**	**831,708**	**1486**	**87**	**237**
I7/9A3A	*	758,160	1153	95	295
IK2AOO	*	246,150	572	59	166
IK2UCK	*	179,550	536	47	103
IR4T	**21**	**80,132**	**535**	**19**	**48**
			(OP: IK4UPB)		
II1H	**14**	**515,274**	**1822**	**37**	**120**
IU3X	**7**	**609,150**	**1996**	**36**	**119**
			(OP: IV3SKB)		
IKØYUT	*	293,832	1347	30	96
IV3RLB	*	10,272	147	12	36
IK1QBT	**3.5**	**121,220**	**1004**	**20**	**75**
IR4B	**1.8**	**8,692**	**167**	**7**	**46**
			(OP: IK4AUY)		
***IR6W**	**A**	**1,972,551**	**2851**	**139**	**414**
			(OP: IK6SNQ)		
***I3JSS**	*****	**987,275**	**1379**	**92**	**299**
*IK4EWX	*	828,723	1151	96	303
*II2B	*	676,280	1168	108	332
			(OP: IZ2BKC)		
*IØ/N6CY	*	641,879	1255	86	243
*IN3FHE	*	510,120	948	71	241
*IK4UNH	*	475,200	786	77	243
*I6FDJ	*	293,475	730	64	209
*IK2NUX	*	267,894	506	63	179
*IK4ZGO	*	168,848	485	61	183
*IZØCIV	*	158,064	403	62	160
*IK8MIG	*	119,448	360	41	148
*IZ8DVD	*	93,600	320	60	165
*IK3ORD	*	86,460	294	65	155
*IZ2DVI	*	70,115	199	55	130
*IK4NPC	*	67,779	237	48	105
*IK2NCF	*	50,479	207	51	92
*IK4DCS	*	50,244	187	57	101
*IK3SSO	*	46,200	303	40	110
*IN3ZWF	*	42,024	229	29	107
*IV3KSE	*	36,057	180	32	69
*IK2RLS	*	32,604	137	44	88
*IV3ZXQ	*	28,930	159	37	73
*IK2ECP	*	24,084	97	39	69
*IZ1DXS	*	23,595	111	46	75
*IK2WYI	*	23,100	120	30	45
*IK3SCB	*	19,320	158	21	35
*IR8C	*	8,730	97	28	62
*IZ1DBY	*	6,499	100	22	45
*I4JEE	*	4,510	42	23	32
*IZ7EUB	*	2,840	61	26	45
*IZØBPI	*	352	12	7	9
***IK2SND**	**28**	**19,564**	**242**	**21**	**46**
***IU1A**	**14**	**138,474**	**679**	**32**	**94**
			(OP: IK1SPR)		
*IZ4DYX	*	6,660	136	7	38
*IZ2FME	*	6,384	98	12	36
***I2IFT**	**7**	**147,808**	**825**	**29**	**95**
*IK3QAR	*	63,504	328	24	84
*IK2AIT	*	29,187	292	14	55
***I2AZ**	**3.5**	**16,240**	**345**	**8**	**48**
*IR5B	*	7,293	153	7	44
*IR7A	1.8	6,700	137	8	42
				(OP: I7ALE)	
		JERSEY			
GJ2A	**A**	**2,502,720**	**2988**	**96**	**344**
				(OP: K2WR)	
*MJØASP	28	1,869	25	11	22
				(OP: F5SHQ)	
		KALININGRAD			
UA2CZ	**A**	**364,311**	**635**	**83**	**226**
		LATVIA			
YL2KO	**A**	**3,115,050**	**2869**	**132**	**438**
YL2PA	*	350,410	715	85	250
YL2GD	*	60,550	189	57	118
YL9W	**3.5**	**211,250**	**1459**	**29**	**96**
YL3IZ	*	131,664	1030	24	80
YL2PQ	**1.8**	**70,705**	**879**	**15**	**64**
YL2VW	*	43,316	589	12	56
***YL2PP**	**A**	**657,096**	**1063**	**90**	**303**
***YL3AD**	*****	**595,272**	**903**	**93**	**315**
*YL85TW	*	300,300	817	72	228
				(OP: YL2TW)	
*YL3FW	*	267,196	692	65	203
*YL3GCU	*	88,740	323	48	126
*YL2PN	*	79,920	306	48	132
*YL2IP	*	61,824	182	65	119
*YL2CR	*	50,868	346	37	125
*YL2GTD	*	45,584	230	40	108
*YL2II	*	13,563	180	39	98
***YL2NK**	**21**	**44,979**	**334**	**19**	**68**
***YL5W**	**14**	**154,624**	**888**	**33**	**101**
*YL2BJ	*	4,704	91	6	36
***YL2RR**	**7**	**49,502**	**314**	**27**	**79**
*YL3DX	*	15,540	166	15	59
		LITHUANIA			
LY2MM	**A**	**1,829,320**	**1689**	**129**	**422**
LY2FN	*	662,196	969	94	303
LY2OX	*	637,304	983	86	242
LY2GF	*	108,405	458	36	99
LY2BBI	*	13,588	96	29	57
LY2IC	**28**	**122,094**	**372**	**36**	**97**
LY2IJ	**14**	**884,260**	**2423**	**39**	**148**
LY9A	*****	**682,020**	**2169**	**37**	**125**
				(OP: LY3BA)	
LY7Z	**7**	**640,224**	**2098**	**39**	**132**
				(OP: LY2TA)	
LY9Y	**3.5**	**290,371**	**1451**	**33**	**106**
				(OP: LY2CY)	
LY2HN	*	125,292	1026	22	84
LY1CT	*	90,780	909	19	70
LY2TE	*	64,239	860	11	58
LY3UM	**1.8**	**108,780**	**842**	**23**	**82**
LY2BW	*	74,971	835	16	63
LY2KM	*	21,306	395	8	45
***LY2MW**	**A**	**2,749,936**	**2593**	**146**	**456**
***LY2KW**	*****	**2,187,360**	**2148**	**129**	**431**
*LY1CX	*	221,260	612	54	176
*LY2BBF	*	169,824	559	49	183
*LY1BX	*	102,816	306	59	145
*LY2BOS	*	94,154	329	45	134
*LY2OM	*	86,100	300	58	152
*LY2DX	*	36,112	187	33	89
*LY2NYY	*	8,064	94	18	46
***LY2AT**	**28**	**46,458**	**215**	**26**	**61**
***LY2OO**	**21**	**51,242**	**296**	**29**	**89**
*LY2CG	*	6,762	96	11	31
***LY2LF**	**14**	**83,300**	**578**	**25**	**73**
***LY2OU**	**7**	**100,908**	**690**	**26**	**92**
***LY1DT**	**3.5**	**113,100**	**996**	**23**	**77**
*LY2BNL	*	2,912	95	4	28
***LY5A**	**1.8**	**66,744**	**766**	**15**	**66**
				(OP: LY2PAJ)	
*LY2GW	*	18,081	391	6	43
*LY2LE	*	6,240	137	7	41
		LUXEMBOURG			
***LX/G3VOO**	**A**	**994,480**	**1310**	**96**	**305**
		MACEDONIA			
Z32XA	**21**	**436,421**	**1608**	**35**	**114**
Z32XX	**3.5**	**264,646**	**1666**	**25**	**88**
***Z36W**	**A**	**1,142,336**	**1496**	**108**	**308**
***Z35G**	**21**	**143,637**	**675**	**28**	**99**
***Z31GX**	**7**	**344,760**	**1379**	**31**	**105**
		MOLDOVA			
ERØND	**3.5**	**345,276**	**1730**	**32**	**106**
				(OP: UT7ND)	
*ER3ZZ	A	10,368	134	30	66
***ER3DX**	**28**	**165,230**	**589**	**32**	**98**
***ER2G**	**1.8**	**6,109**	**126**	**8**	**40**
		NETHERLANDS			
PA3AAV	**A**	**2,785,452**	**2564**	**133**	**449**
PAØABM	*****	**1,012,245**	**1062**	**125**	**412**
PA5TT	*	970,612	1181	101	330
PAØJNH	*	709,410	998	93	297
PAØLOU	*	385,479	596	92	291
PA4EA	*	137,995	388	58	135
PAØADT	*	120,016	412	49	141
PA5GN	*	57,728	221	51	113
PAØINA	28	5,797	59	18	27
PA5WT	**7**	**84,706**	**785**	**17**	**65**
PA3FGA	**1.8**	**11,664**	**272**	**6**	**42**
***PA3BFH**	**A**	**1,215,074**	**1571**	**98**	**360**
***PG7V**	*****	**1,092,234**	**1714**	**92**	**310**
***PA3EMN**	*****	**1,014,650**	**1282**	**98**	**348**
*PA1V	*	757,764	1250	87	301
*PA3GVI	*	335,088	1052	60	174
*PAØMBD	*	231,732	468	87	227
*PAØCOR	*	198,131	520	66	173
*PA2ALF	*	118,560	422	46	114
*PC7T	*	114,000	290	68	172
*PA5V	*	108,450	379	54	111
*PAØKHS	*	98,530	335	50	117
*PC4M	*	91,970	347	45	125
*PA3HGF	*	84,623	295	41	116
*PA3GBI	*	81,702	301	47	106
*PA7RA	*	76,791	292	53	126
*PA3AFF	*	76,266	302	43	128
*PAØLSK	*	68,975	267	49	106
*PAØADP	*	60,912	256	43	101
*PA2DGR	*	53,924	285	38	84
*PE1HWO	*	49,128	210	43	95
*PA7XG	*	30,135	203	32	91
*PA3EBP	*	15,743	97	29	62
*PCØH	*	8,256	49	29	35
*PA5O	*	5,120	51	17	23
*PA3FXS	*	1,936	51	15	29
*PAØB	28	6,786	105	14	15
***PB5CW**	**21**	**90,125**	**598**	**23**	**88**
*PA1RBZ	*	34,272	266	20	48
*PAØMIR	*	25,256	143	22	55
***PAØDVM**	**1.8**	**5,460**	**141**	**4**	**35**
*PAØCYW	*	812	25	6	22
		NORTHERN IRELAND			
GI4KSH	**A**	**210,289**	**520**	**52**	**171**
GIØKOW	**14**	**921,480**	**2835**	**37**	**133**
				(OP: GIØNWG)	
		NORWAY			
LA7MFA	**A**	**64,250**	**245**	**38**	**87**
LA2IJ	*	50,250	205	49	101
LA4LN	*	35,013	121	50	91
***LA1VFA**	**A**	**572,670**	**1287**	**74**	**229**
*LA1YE	*	211,254	470	59	198
*LA7TO	*	120,006	387	51	126
*LA7SI	*	71,242	277	47	132
*LA1DXG	*	45,069	142	58	123
*LB8AE	*	31,000	202	26	98
*LA8CE	*	28,599	119	47	58
*LA4YGA	*	6,825	46	29	36
*LA6PHA	*	10	8	8	8
***LA5UF**	**7**	**148,875**	**834**	**30**	**95**
***LA8WG**	**3.5**	**18,152**	**251**	**13**	**55**
		POLAND			
SQ6Y	**A**	**2,064,456**	**2553**	**117**	**424**
				(OP: SQ6MS)	
SN5N	*	889,678	1634	95	287
SP4BEU	*	583,668	810	92	280
SP9LJD	*	531,679	863	92	267
SP2GMA	*	269,868	591	64	194
SP6IEQ	*	257,238	452	88	191
SP4AVG	*	28,350	164	32	73
SP3FAR	*	25,334	99	40	66
SO1RON	*	20,304	227	14	58
SP5MXT	*	4,284	61	24	44
SP6CZ	*	4,275	48	30	45
SP4D	**28**	**231,602**	**754**	**37**	**105**
SP2EXN	*	87,330	363	33	109
SP9DWT	*	85,684	304	34	90
SP2IU	*	78,300	305	31	77
SP2BLC	*	25,317	144	37	38
SP5LCC	*	23,005	90	32	75
SP4TKR	**21**	**269,390**	**925**	**36**	**122**
SN7Q	**14**	**827,680**	**2730**	**37**	**123**
SN8V	*	534,916	1785	39	134
SP3KEY	**7**	**540,380**	**1858**	**39**	**125**
				(OP: SP3HRN)	
SN8R	*	247,256	1561	30	94
				(OP: SP8QNZ)	
SP6EQZ	*	123,522	766	27	92
SP2LNW	*	46,534	248	23	83
SP5BNB	*	9,200	110	21	59
SP5ENA	*	6	1	1	1
SP8RQ	**3.5**	**247,833**	**1240**	**31**	**106**
SP4MPB	*	176,056	1178	28	90
SP6A	*	173,124	1170	27	81
SP7JQQ	*	68,890	692	18	65
SN2N	*	49,632	623	22	72
				(OP: SP2ASJ)	
SP5GH	*	37,646	177	21	82
SP3BQ	**1.8**	**136,250**	**1106**	**27**	**82**
				(OP: SP3RBR)	
SP2AJO	*	24,948	390	10	56
SP6AEG	*	11,716	212	9	49
***SP4ZO**	**A**	**2,158,786**	**2256**	**126**	**416**
***SP9DAE**	*****	**1,321,138**	**1800**	**94**	**333**
*SP1AEN	*	796,764	1134	95	307
*SP9RTI	*	591,180	983	93	261
*SQ9FMU	*	586,560	963	90	286
*3Z2D	*	509,496	1113	78	234
				(OP: SP2DNI	
*SP3BJK	*	444,600	820	78	222
*SP6LV	*	425,988	1042	85	262
*SP9GFI	*	317,249	760	61	220
*SP9GKM	*	312,613	692	62	197
*SQ3A	*	302,604	600	73	229
*3Z8Z	*	301,670	510	91	220
*SP3HC	*	298,505	686	70	193
*SP1DPA	*	284,791	501	77	170
*SQ9MZ	*	269,724	618	69	204
*SP9ODL	*	263,934	585	71	187
*SN6J	*	248,976	491	85	251
				(OP: SP5JXK)	
*SP1DTG	*	229,108	526	64	190
*SP9FT	*	228,228	543	67	180
*SP3KCL	*	210,936	430	82	182
				(OP: SP3FLR)	
*SP3OL	*	205,857	494	63	194
*SP5GDY	*	193,116	353	79	187
*SP2HMT	*	178,728	431	69	195
*SP2AYC	*	169,043	352	61	156
*SP9LAS	*	138,880	330	66	158
*SP9ADV	*	137,385	371	64	151
*SP8GNF	*	135,459	458	66	195
*SP4JTJ	*	134,183	321	64	139
*SP3DOF	*	120,960	355	62	154
*SP2IW	*	115,731	330	65	166
*SP8FHJ	*	104,760	383	57	159
*SP8EDD	*	92,800	377	54	146
*SP4GHL	*	85,065	312	54	156
*SP6BEN	*	84,912	214	54	120
*SP9MRQ	*	76,382	339	45	136
*SO1VAF	*	67,841	294	47	132
*SP6AXW	*	58,598	216	47	119
*SP5ULV	*	56,457	174	47	76
*SP6GNJ	*	54,249	200	48	121
*SP2UKB	*	49,020	217	31	64
*SP9VRY	*	37,000	190	42	83
*SP9LWH	*	29,274	170	38	85
*SP7TEX	*	24,062	128	37	69
*SP6HRK	*	23,247	87	50	73
*SP7JOA	*	22,512	399	8	48
*SP6CES	*	22,222	114	32	50
*SP7AWG	*	21,708	142	32	76
*SP7BDS	*	19,730	158	33	80
*SO1CE	*	19,425	142	31	74
*SP9MCU	*	17,176	121	28	48
*SP9IBJ	*	17,043	204	16	53
*SP2GKQ	*	16,936	228	12	46
*SP9KGG	*	15,521	150	26	87
				(OP: SP9IKN)	
*SQ1EUG	*	13,671	142	29	64
*SP7HOA	*	5,922	47	21	26
*SP3KRE	*	3,799	63	14	34
				(OP: SQ3HTX)	
*SP2UT	*	3,613	49	18	30
*SP3FLQ	*	3,599	80	15	44
*SP9IKN	*	3,251	59	1	48
*SP1MWK	*	3,025	30	25	30
*SP1RWA	*	2,686	36	17	17
*SP9CQ	*	2,340	39	10	29
*SO1JBW	*	2,323	124	25	76
*SP7EXJ	*	720	21	19	21
*SP6BSL	*	551	11	9	10
***SP3LWP**	**28**	**148,115**	**471**	**36**	**112**
*SP1GZF	*	81,039	317	33	89
*SQ4MP	*	79,786	329	32	107
*SP9DLY	*	74,580	306	31	79
*SP3FPF	*	34,265	153	27	62
*SP2MKI	*	14,404	111	21	31
*SP6SYF	*	12,320	89	23	40
*SP3AOT	*	10,499	115	17	24
*SQ6ELV	*	5,760	83	17	23
*SP2HXY	*	3,484	72	11	15
*SP2FAV	*	286	8	6	7
***SP4JCQ**	**21**	**77,469**	**383**	**30**	**89**
***SP9ODY**	*****	**68,875**	**379**	**30**	**95**
*SP6EIY	*	58,520	263	28	82
*SP1CHV	*	43,008	201	27	69
*SP7FBQ	*	26,208	154	21	57
*SP6DMI	*	20,822	219	16	42
*SP6PAX	*	4,512	88	10	24
				(OP: SP6DHH)	
*SQ3GNA	*	232	59	10	19
***SP8BAB**	**14**	**61,452**	**328**	**25**	**83**
*SP2AVE	*	45,933	347	25	73
*SP2JGK	*	22,981	252	13	54
*SP9DNO	*	21,760	186	19	61
*SN4AAZ	*	6,405	109	13	48
*SP1BLE	*	5,541	102	9	42
***SP3CCT**	**7**	**158,180**	**945**	**24**	**86**
*SP5CNA	*	68,548	388	26	91
*SP3FYX	*	58,016	370	28	84
*SP3EQE	*	35,424	219	22	74
*SP9EMI	*	35,061	211	20	67
*SQ3WW	*	21,012	198	14	54
*SP6M	*	18,040	85	28	82
*SP9QJ	*	16,929	160	16	56
*SP5CGN	*	13,120	123	15	49
*SP5IMK	*	2,160	47	9	21
*SP6FIB	*	23	3	3	3
***SO9N**	**3.5**	**106,344**	**1062**	**18**	**66**
			(OP: SP9XCN)		
*SP5MXZ	*	42,196	445	16	61
*SP9OUX	*	41,778	584	11	55
*SP3DIK	*	31,680	355	14	58
*SP8BVN	*	29,504	416	11	53
*SP3JIA	*	26,320	265	16	64
*SQ9IET	*	22,250	477	7	43
*SQ9CAQ	*	13,889	248	10	47
*SP9PTG	*	8,527	155	6	61
			(OP: SP9BVC)		
*SP3MEP	*	6,480	147	8	37
*SQ3BKL	*	2,124	95	5	31
***SP2FWC**	**1.8**	**28,800**	**481**	**7**	**53**
***SP3PL**	*****	**26,700**	**493**	**8**	**52**
*SP5ELA	*	17,270	315	6	49
		PORTUGAL			
CT8T	**A**	**7,613,600**	**5969**	**142**	**478**
			(OP: OH1NOA)		
CT1DJE	*	25,788	130	39	85
***CQØT**	**A**	**5,174,184**	**4189**	**139**	**493**
			(OP: CT1ILT)		
*CT1GPQ	*	292,336	815	64	178
*CT1DHM	*	63,800	309	54	146
*CT1AOZ	*	49,588	195	37	61
*CT1BNW	*	25,580	149	33	49
*CT1EGW	*	238	7	7	7
***CT4DX**	**14**	**34,295**	**269**	**22**	**73**
		ROMANIA			
YO7BGA	**A**	**240,350**	**550**	**71**	**204**
YP3A	**21**	**557,375**	**1656**	**37**	**138**
			(OP: YO3GDA)		
YO5KAI	**7**	**281,320**	**1602**	**32**	**98**
			(OP: YO5OHO)		
YR2I	**3.5**	**152,802**	**1134**	**28**	**89**
			(OP: YO2DFA)		
***YO3APJ**	**A**	**2,653,675**	**2348**	**135**	**458**
*YO5CBX	*	739,138	1298	90	277
*YO5DAS	*	362,957	817	78	250
*YO7LGI	*	239,682	536	74	184
*YO9FYP	*	116,735	444	46	139
*YO5PBF	*	95,040	419	45	120
*YO7ARY	*	87,837	449	49	152
*YO3CTK/7	*	83,157	272	55	104
*YO3III	*	12,956	110	22	60
*YO8MI	*	7,748	83	32	52
*YO9HG	*	4,929	114	10	43
***YO6BHN**	**28**	**84,816**	**302**	**31**	**93**
*YO4ATW	*	35,760	176	29	51
*YO5CRQ	*	21,840	129	27	43
*YO2AQB	*	14,066	121	20	33
***YO5AGI**	**21**	**66,239**	**376**	**29**	**81**
*YO9HP	*	2,210	40	11	15
***YO8BIG**	**14**	**114,724**	**721**	**26**	**90**
*YO4GDP	*	99,110	641	27	83
*YO6RIX	*	11,256	158	15	52
***YO3ND**	**7**	**312,450**	**1338**	**33**	**117**
*YO9WF	*	90,748	728	24	74
*YO8BPY	*	12,612	153	11	57
*YO7BGB	*	3,654	92	7	35
***YO2RR**	**1.8**	**19,133**	**376**	**6**	**47**
*YO2IS	*	16,124	285	8	50
		SARDINIA			
ISØHQJ	**A**	**181,460**	**574**	**55**	**156**
ISØ/YO3RA	*	1,785	28	16	19
***ISØOMH**	**A**	**35,673**	**195**	**47**	**94**
*ISØUDF	*	16,895	124	34	75
*ISØIEK	*	100	38	12	23
*ISØILP	*	100	128	18	55
*ISØSDX	21	8,142	104	18	41
*ISØUWX	14	7,560	164	18	54
		SCOTLAND			
GM4YXI	**A**	**3,681,870**	**3401**	**139**	**416**
GM3W	*	1,364,975	1978	87	268
				(OP: GM3JKS)	
GM4SID	*	235,014	603	61	201
***GM4FAM**	**A**	**1,493,522**	**1785**	**118**	**424**
*MMØWPM	*	172,224	598	46	188
***GMØIIO**	**21**	**87,480**	**485**	**25**	**83**
*GM3CFS	*	81,596	401	26	95
		SHETLAND ISLANDS			
GZ7V	**A**	**3,141,570**	**3604**	**116**	**402**
			(OP: GM4AFF)		
		SICILY			
IT9BLB	**28**	**431,802**	**1396**	**34**	**104**
***IT9ORA**	**A**	**301,324**	**637**	**70**	**214**
*IT9AJP	*	175,203	396	62	181
***IR9AF**	**21**	**83,846**	**747**	**30**	**76**
		SLOVAK REPUBLIC			
OM3IAG	**A**	**966,170**	**1396**	**106**	**289**
OM8AA	*	440,748	723	99	272
OM4JD	*	372,944	679	78	248
OM3NA	**14**	**518,010**	**1817**	**36**	**119**
OM5AG	7	6,223	78	14	35
OM6TU	**3.5**	**23,154**	**403**	**9**	**42**
***OM7CA**	**A**	**979,914**	**1243**	**103**	**339**
***OM4DN**	*****	**877,836**	**1243**	**89**	**293**
*OM8ON	*	807,576	797	115	347
*OM8AQ	*	773,784	1111	102	294
*OM7RU	*	748,926	1200	95	307
*OM7AG	*	617,660	1182	81	275
*OM2VL	*	536,067	885	100	281
*OM7DX	*	487,631	955	89	293
*OM8FF	*	447,108	879	84	234
*OM7RC	*	313,616	608	76	196
*OM3PQ	*	296,148	633	68	208
*OMØTT	*	285,354	655	69	253
*OM1AW	*	219,830	539	68	179
*OM1AF	*	188,690	554	47	163
*OM7AT	*	107,400	439	51	147
*OM7TJ	*	72,893	286	39	95
*OM4DA	*	50,922	292	33	105
*OM3CFR	*	36,018	200	45	93
*OM4TC	*	30,210	221	27	68
*OM7VF	*	27,813	189	39	88
*OM8HG	*	2,520	35	16	26
***OM7YC**	**21**	**34,428**	**217**	**20**	**56**
***OM2AK**	**14**	**100,894**	**507**	**30**	**92**
*OM3ROM	*	80,855	495	25	78
				(OP: OM4TQ)	
*OM2AW	*	48,960	397	24	78
***OM6TY**	**7**	**145,024**	**765**	**29**	**99**
***OM4WW**	**3.5**	**50,178**	**711**	**14**	**64**
		SLOVENIA			
S57DX	**A**	**4,370,912**	**3596**	**161**	**471**
S53O	*	3,231,522	2752	144	474
S52OM	**28**	**379,469**	**1132**	**37**	**120**
S52EZ	**21**	**275,575**	**982**	**34**	**117**
S58A	**14**	**818,802**	**2291**	**38**	**139**
S57AL	*	488,538	1724	37	129
S58A	**7**	**955,719**	**2900**	**38**	**133**
S51RJ	*	564,450	2017	37	122
S58C	**3.5**	**356,130**	**1767**	**31**	**104**
				(OP: S53MM)	
S58G	*	139,776	1281	19	72
				(OP: S56M)	
S57Q	*	128,250	1186	21	74
S58U	**1.8**	**95,570**	**992**	**20**	**75**
***S52A**	**A**	**2,715,625**	**2151**	**143**	**482**
*S52OP	*	1,803,921	1901	126	363
*S54X	*	340,918	597	80	191
*S57J	*	255,564	447	88	191
*S51MF	*	124,998	229	88	163
*S53AU	*	44,992	122	56	92
*S57OGC	*	39,208	203	33	83
*S57NAW	*	29

SM5COP	28	360	8	7	8
SM5INC	**21**	**543,519**	**1845**	**34**	**97**
SMØKV	*	121,624	480	36	112
SM2JEB	**14**	**178,608**	**686**	**30**	**92**
7S5C	*	44,296	292	25	73
			(OP: SM5CBM)		
7S2E	**7**	**559,680**	**2142**	**36**	**123**
			(OP: SM2DMU)		
SM5CEU	**3.5**	**185,592**	**977**	**31**	**101**
SMØAJU	**1.8**	**15,480**	**233**	**11**	**49**
***7S7V**	**A**	**1,305,968**	**1573**	**126**	**370**
***SM6D**	*	**753,100**	**1030**	**98**	**327**
			(OP: SM6DER)		
*SM2KAL	*	723,411	1398	84	267
*SM6NET	*	571,504	984	81	287
*SM6BSK	*	452,672	645	82	270
*SM7EH	*	409,130	837	77	249
*SMØWRA	*	236,964	564	62	211
*SMØJ	*	136,956	442	51	151
			(OP: SMØOZH)		
*SM2UJW	*	131,670	463	53	178
*SM6XKB	*	86,751	398	52	137
*SMØBOS	*	83,961	274	52	119
*SM7BQX	*	56,964	233	43	98
*SM7CWI	*	55,554	199	44	97
*SM3AVW	*	32,200	134	39	53
*SM6YIN	*	28,296	128	46	62
*SM5QU	*	27,744	220	27	75
*SM6DUA	*	21,989	142	32	80
*SM7BVO	*	13,680	100	23	57
*SL5ZXR	*	22	3	2	2
*SM7GCZ	14	22,890	110	24	74
*SM3EAE	*	1,825	33	12	13
*SM5DUT	*	1,036	53	10	27
*SM5ARR	*	587	15	8	10
*SM4BW	7	2,863	82	7	24
***SM5MX**	**3.5**	**67,425**	**621**	**20**	**73**
*8S6A	*	19,376	320	8	48
			(OP: SM6DPF)		
*7S6V	*	3,588	102	7	32
			(OP: SM6PVB)		
SWITZERLAND					
HB9CIP	**A**	**454,310**	**676**	**104**	**258**
HB9DCL	*	49,621	264	45	98
HB9IQB	**3.5**	**82,053**	**871**	**18**	**63**
***HB9CZF**	**A**	**1,313,753**	**1536**	**102**	**311**
*HB9ARF	*	1,030,568	1403	100	292
*HB9CBR	*	411,897	673	83	226
*HB9QA	*	19,240	116	43	87
*HB9AFH	28	12,960	90	23	49
*HB9CPS	21	32,964	182	23	59
UKRAINE					
UY5ZZ	**A**	**2,121,852**	**2140**	**148**	**456**
UYØZG	*	**1,235,838**	**1199**	**138**	**424**
UT2UB	*	1,216,017	1453	124	395
UT5ECZ	*	729,238	1194	87	295
UW2ZM	*	726,264	1214	96	297
UY5ZI	*	501,221	720	96	275
UX5UO	*	233,436	416	80	214
UR5FEL	*	214,656	577	74	238
UR7EU	*	195,120	431	74	166
UT2IW	*	123,753	248	80	169
UXØZA	*	30,702	130	45	74
UT5JAP	*	13,524	66	35	57
UT3EK	*	6,100	93	11	39
UT5UGR	**21**	**324,000**	**1005**	**35**	**127**
UT4EK	**14**	**121,814**	**765**	**28**	**85**
UU1JO	*	10,530	104	17	64
UT2IV	**7**	**389,576**	**2184**	**36**	**116**
EN1U	*	372,816	1456	33	111
			(OP: UX1UA)		
UW5U	**3.5**	**203,200**	**1268**	**29**	**98**
			(OP: UY2UA)		
UR5IOK	*	116,160	747	30	91
UT8IM	*	93,009	722	25	78
UT5IZ	*	88,960	966	16	64
US9PA	*	49,815	504	17	64
US2WU	*	45,214	465	21	73
EO6F	**1.8**	**53,200**	**613**	**14**	**66**
			(OP: UXØFF)		
***UR3HC**	**A**	**2,145,027**	**2600**	**125**	**394**
***UY8IF**	*	**1,183,680**	**1347**	**136**	**440**
*USØKW	*	1,022,309	1432	114	343
*UYØIX	*	873,563	1388	103	334
*UR6QS	*	816,480	1274	95	310
*UY5TE	*	552,992	1022	82	270
*UX4UA	*	544,157	706	105	296
*UR7EQ	*	526,384	1031	74	260
*UR5IFB	*	515,151	836	86	247
*UT1IR	*	485,416	740	92	284
*EMØU	*	467,495	840	92	269
			(OP: UT3UZ)		
*US5II	*	420,867	591	117	346
*UT8IT	*	397,458	828	73	238
*UT4EO	*	315,648	843	74	200
*UR5FS	*	266,325	563	69	196
*UU2JA	*	225,645	404	82	225
*UX8ZA	*	195,822	584	61	192
*UT5PW	*	149,572	330	71	173
*UR3PA	*	111,639	283	53	146
*UR8RF	*	111,000	195	82	168
*UT5UJY	*	105,324	397	47	154
*US6IMA	*	102,648	472	48	140
*UT4MF	*	93,972	226	63	128
*UY2ZA	*	64,774	308	32	107
*UR5GMG	*	57,155	409	41	120
*UXØKR	*	56,242	327	25	97
*UX1IB	*	55,645	318	35	120
*UTØRM	*	52,882	176	56	81
*US7IB	*	40,754	161	39	103
*USØKF	*	21,168	192	23	85
*UT5JDS	*	19,488	72	49	67
*UR5ZQV	*	16,576	148	33	79
*UR7QJ	*	10,710	105	30	60
*US7QQ	*	6,726	49	19	40
*UT2QQ	*	5,110	61	23	50
*US3IZ	*	3,100	30	21	29
*UR5QU	*	520	15	11	15
*UXØIK	*	100	1260	100	289
*UR5KAT	*	100	76	11	37
***UX5EF**	**28**	**40,887**	**210**	**30**	**61**
*UY5YA	*	17,018	143	21	46
***UT3FM**	**21**	**73,920**	**323**	**26**	**86**
*UR5RNO	*	60,152	289	27	76
*UR5IPD	*	59,077	339	28	87
*UT4IZL	*	46,476	359	22	71
			(OP: UR6IMR)		
***EN1I**	**14**	**236,495**	**1076**	**35**	**110**
			(OP: US1ITU)		
***UXØZX**	*	**168,925**	**749**	**35**	**110**
*UY5LQ	*	140,996	1000	30	71
*UR7QM	*	69,525	456	27	76
*UX7QD	*	53,460	431	21	69
*UT4NY	*	36,757	274	21	68
*UY5OQ	*	27,084	251	15	59
*UT1PO	*	19,170	158	16	55
*UY3AW	*	13,696	134	15	49
***UT3QT**	**7**	**119,952**	**651**	**29**	**97**
*UW2F	*	100,716	624	23	86
			(OP: UTØFT)		
*UY7LM	*	67,228	526	23	75
*UT4NW	*	54,747	309	21	78
*UT5UML	*	20,075	196	14	59
*UY2ZZ	*	3,132	52	10	26
***UT2UZ**	**3.5**	**64,504**	**551**	**21**	**67**
*UX2MF	*	61,254	559	16	67
*US4EX	*	51,830	629	14	59
*UR3LM	*	46,575	557	14	61
*UR4III	*	13,000	191	11	41
***UT1FA**	**1.8**	**28,121**	**466**	**9**	**52**
***UX5NQ**	*	**25,110**	**596**	**8**	**46**
*US9QA	*	18,615	364	8	43
*USØQG	*	7,072	145	8	41
WALES					
MW5A	**A**	**4,790,079**	**4045**	**126**	**421**
			(OP: G3WVG)		
MW5EPA	*	28,254	165	31	71
GW3NJW	**14**	**274,375**	**1280**	**28**	**97**
***GW4MVA**	**A**	**520,498**	**619**	**94**	**387**
*GW3KJN	*	240,327	546	67	176
*MW0GMB	*	121,770	390	50	148
YUGOSLAVIA					
YT1AD	**A**	**5,171,952**	**3968**	**163**	**473**
YT7KM	*	1,667,819	1885	119	374
YZ1AU	**21**	**582,562**	**1800**	**38**	**125**
YT7Z	*	353,904	1399	33	113
YU1ATA	*	173,472	752	32	107
YT9X	**14**	**615,087**	**2073**	**38**	**133**
			(OP: YU1ZZ)		
YZ9A	*	609,168	1890	36	132
YZ1U	*	383,834	1506	36	110
			(OP: YU1WS)		
YT9M	*	119,841	638	28	101
4O8AA	*	39,974	434	20	59
YT7A	**7**	**818,017**	**2524**	**39**	**130**
YZ1W	*	486,873	2232	33	108
			(OP: YT1HA)		
YU7HC	*	19,370	217	14	51
YU7AV	**3.5**	**338,259**	**1685**	**33**	**108**
YU1EA	*	164,736	1385	23	81
YU1CC	*	47,685	513	16	69
***4N7M**	**A**	**2,766,495**	**2689**	**127**	**444**
			(OP: YT7AW)		
*YU1JU	*	664,296	1246	89	267
*YU7AM	*	556,150	851	92	258
*YU1KT	*	444,774	975	79	214
*YT1AT	*	337,218	740	76	218
*YZ1EZ	*	264,320	737	80	215
*YU1EQ	*	251,089	648	66	191
*YU7DD	*	100	109	19	45
***YU1IG**	**21**	**125,904**	**508**	**33**	**96**
***YZ7FM**	**14**	**202,368**	**1156**	**30**	**94**
***4N1FG**	**7**	**334,592**	**1616**	**31**	**97**
*4N7N	*	226,310	1153	30	92
*YT1LT	*	162,192	915	29	95
*YU7W	*	60,697	518	20	71
*YU1PJ	*	22,780	188	15	52
***YT1R**	**1.8**	**51,300**	**644**	**12**	**63**
			(OP: YU1RA)		
*4N7ZZ	*	33,480	447	13	59
*YU1AST	*	8,280	224	6	39
			(OP: 4N1JA)		

OCEANIA

AUSTRALIA					
VK6AA	**A**	**5,933,760**	**3822**	**155**	**405**
VK4UC	*	**5,880,005**	**3737**	**160**	**385**
			(OP: N6AA)		
VK4AN	*	1,799,175	1506	133	314
VK6DXI	*	1,294,083	1297	108	261
VK7GN	*	982,163	1343	101	200
VK3IO	*	237,326	427	79	135
VK4BUI	*	46,706	108	101	92
VK4WPX	*	5,151	44	24	27
VK6LW	**7**	**610,067**	**1753**	**32**	**99**
***VK2DPD**	**A**	**383,702**	**539**	**106**	**220**
*VK2KM	*	114,680	229	63	125
*VK6HG	*	110,259	241	70	129
*VK2AR	*	60,455	219	35	78
*VK4TT	*	38,760	226	22	38
*VK1BL	*	910	18	10	16
***VK2IMM**	**28**	**22,936**	**172**	**18**	**29**
***VK4DX**	**14**	**304,437**	**838**	**30**	**103**
COCOS-KEELING					
***VK9CJ**	**A**	**463,250**	**800**	**80**	**170**
EAST MALAYSIA					
9M8YY	**3.5**	**44,730**	**235**	**21**	**49**
EAST TIMOR					
***4W3CW**	**A**	**166,656**	**356**	**73**	**119**
GUAM					
WH2A	**28**	**635,628**	**1663**	**38**	**103**
HAWAII					
KH7X	**A**	**7,673,314**	**5256**	**170**	**347**
			(OP: KH6ND)		
KH6/K1ER	*	12,144	78	43	49
***KH6/KE0UI**	**A**	**244,543**	**578**	**73**	**96**
*KH6/N0CO	*	88,128	257	56	80
*KH6OO	*	36,765	176	46	49
INDONESIA					
YE0X	**A**	**1,163,088**	**1410**	**104**	**224**
			(OP: OK1JR)		
***YB0ECT**	**A**	**1,987,470**	**1895**	**118**	**315**
*YB5QZ	*	271,548	726	74	154
*YB2EMK	*	35,185	127	56	99
*YD2VY	*	31,110	148	33	69
*YC3MM	*	23,976	112	29	52
*YD3JBJ	*	100	18	10	11
*YBØWWW	28	4,059	56	14	27
***YD3JMO**	**21**	**285,228**	**1005**	**32**	**82**
*YC2XP	*	95,076	457	34	80
*YB2DGR	7	8,342	72	18	25
NEW CALEDONIA					
***FK8KAB**	**A**	**62,964**	**630**	**78**	**120**
NEW ZEALAND					
ZL/W1CU	**A**	**433,532**	**646**	**84**	**152**
***ZL2BR**	**A**	**1,360,464**	**1460**	**105**	**231**
***ZL/W3SE**	*	**1,293,320**	**1645**	**104**	**194**
*ZL2AL	*	87,885	229	66	89
NORTHERN MARIANAS					
WHØV	**A**	**45,290**	**250**	**27**	**43**
KHØP	*	7,475	101	13	12
PHILIPPINES					
DU3NXE	**A**	**334,755**	**723**	**80**	**93**
DU1EV	7	1,184	46	7	9
***DXØM**	**A**	**896,830**	**1495**	**92**	**171**
			(OP: LA6FJA)		
*4D71/NØNM	*	338,520	680	80	115
			(OP: NØNM)		
TONGA					
***A35RK**	**21**	**138,860**	**480**	**33**	**73**

SOUTH AMERICA

ANTARCTICA					
R1ANC	14	168	11	6	6
ARGENTINA					
LU7DIR	**A**	**174,908**	**481**	**51**	**95**
LO7H	*	157,036	392	49	117
			(OP: LU7HIN)		
LQ7D	**28**	**1,365,860**	**3128**	**38**	**117**
			(OP: LW9DA)		
LT1F	*	**1,138,956**	**2916**	**34**	**113**
			(OP: LU1FAM)		
LU5FC	*	920,736	2753	34	104
LU5FB	**21**	**563,332**	**1676**	**29**	**95**
			(OP: LU1AEE)		
LU7YS	*	31,295	237	23	32
LU1FGE	**14**	**562,900**	**1545**	**36**	**94**
LU8XW	*	209,272	1002	24	77
			(OP: LU3XQ)		
LU8VCC	*	3,920	120	19	37
LU8ADX	**7**	**2,730**	**31**	**12**	**23**
***LU1EWL**	**A**	**812,066**	**1280**	**85**	**178**
*LU2FLN	*	450,358	1295	51	115
***LU5FF**	**28**	**600,608**	**1633**	**31**	**106**
*LW1EXU	*	506,466	1689	29	84
*LW7DX	*	433,608	1431	28	88
*LW8DQ	*	426,162	1345	28	93
*LU1FZR	*	265,080	1146	27	67
*LW2DX	*	69,230	379	20	50
*LW2EU	*	10,315	88	17	46
***LW9EOC**	**21**	**466,238**	**1812**	**30**	**83**
*LU5FZ	*	162,840	705	26	66
*LU2AS	*	148,242	635	26	67
*LU8HZ	*	112,520	448	25	72
*LU2EE	*	62,811	376	19	44
			(OP: LW5EE)		
*LU7EAR	*	43,542	203	21	61
***LU2XX**	**14**	**79,220**	**437**	**27**	**58**
			(OP: LU1XS)		
*LU4HKN	*	6,570	61	18	27
***LU7EE**	**1.8**	**132**	**10**	**5**	**7**
ARUBA					
P4ØE	**A**	**15,943,070**	**7828**	**169**	**546**
			(OP: CT1BOH)		
P4ØTA	**21**	**1,289,475**	**2798**	**35**	**130**
			(OP: K6TA)		
P4ØR	**14**	**1,493,316**	**3264**	**38**	**124**
			(OP: K4UEE)		
P4ØK	**1.8**	**104**	**5**	**3**	**5**
			(OP: K6KO)		
BRAZIL					
ZX2B	**A**	**804,540**	**646**	**113**	**347**
			(OP: PY2MNL)		
PT2ZAW	*	105,742	382	38	60
PP7ZZ	*	103,586	289	52	99
PX2W	**28**	**1,213,924**	**2768**	**37**	**120**
			(OP: PY2YU)		
PY2YP	**21**	**355,698**	**1074**	**30**	**96**
PY7ZY	**3.5**	**44,092**	**255**	**16**	**57**
PV8DX	*	33,573	232	15	42
***PY2NA**	**A**	**1,927,656**	**2048**	**106**	**263**
*PY4FQ	*	793,860	988	83	220
*PY2OI	*	663,714	1074	80	161
*PY5BLG	*	335,100	707	63	136
*PY7EG	*	195,017	569	44	95
*PY7IQ	*	134,820	375	43	83
			(OP: PY2IQ)		
*PY3OL	*	105,616	289	61	103
*PP7CW	*	67,896	195	46	92
*PY2NB	*	28,126	148	38	60
*PY2GG	*	20,811	92	39	67
*PY7OJ	*	18,126	88	44	62
*PY7ILM	*	12,276	90	23	43
*PS7DX	*	6,850	77	21	29
*PR7NJ	*	1,666	52	20	29
*PY3CGX	*	621	19	7	9
*PY3CAL	*	100	38	11	10
*PY3GAD	*	100	36	15	23
***PR7FN**	**28**	**396**	**18**	**9**	**9**
*PY2BRZ	*	132	19	7	5
***PR7AF**	**21**	**101,007**	**502**	**19**	**68**
*PR7AR	*	77,163	425	23	66
*PY3AU	*	24,131	149	20	39
***PY2NY**	**14**	**501,512**	**1335**	**33**	**106**
*ZX3S	*	183,048	826	24	63
			(OP: PY3MM)		
*PY4CEL	*	12,416	131	19	45
*PR7GY	*	130	199	20	45
***PY7CJN**	**7**	**2,584**	**45**	**11**	**23**
*PV8IG	*	1,242	66	11	35
CHILE					
CE3BFZ	**28**	**4,620**	**61**	**12**	**16**
***XQ4ZW**	**28**	**382,360**	**1133**	**29**	**92**
COLOMBIA					
HK5QGX	**21**	**903**	**70**	**4**	**3**
HK1HHX	**14**	**507,994**	**1637**	**29**	**105**
***HK1AA**	**A**	**153,990**	**387**	**51**	**126**
FALKLAND ISLANDS					
***VP8/LZ2UU**	**A**	**3,317,808**	**2969**	**120**	**289**
FERNANDO DE NORONHA					
PXØF	**7**	**1,055,250**	**2623**	**35**	**115**
			(OP: YU1RL)		
NETHERLANDS ANTILLES					
PJ4M	**A**	**3,639,168**	**3439**	**100**	**284**
			(OP: K2QM)		
PARAGUAY					
ZP6CW	**1.8**	**487**	**15**	**11**	**14**
PERU					
OA4SS	**28**	**516,460**	**1518**	**27**	**92**
URUGUAY					
CX7CO	**21**	**1,150,620**	**2738**	**36**	**115**
CX2AM	*	88,608	381	31	73
CX7BY	**14**	**616,154**	**1441**	**36**	**118**
***CW4A**	**21**	**863,282**	**1918**	**37**	**124**
***CX9AU**	**7**	**90,436**	**377**	**26**	**66**
VENEZUELA					
4M5X	**14**	**1,380,690**	**3216**	**39**	**135**
			(OP: W4SO)		
***4M7A**	**A**	**289,677**	**646**	**64**	**159**
MARITIME MOBILE					
***MM/ZL1CT**	**14**	**200,705**	**562**	**34**	**103**

QRP

FY5FY	**A**	**3,862,527**	**3837**	**106**	**341**
N4KG	*	**1,166,832**	**980**	**111**	**333**
N8ET	*	**947,232**	**854**	**110**	**319**
SM3C	*	**865,293**	**1142**	**102**	**327**
UA9SG	*	**767,151**	**894**	**95**	**273**
N1TM	*	**762,777**	**753**	**84**	**303**
LY2FE	*	**716,046**	**1201**	**91**	**302**
RA9SO	*	**653,910**	**778**	**63**	**244**
EU2MM	*	**648,698**	**1049**	**94**	**303**
JR4DAH	*	**634,092**	**769**	**105**	**213**
YU1LM	*	**597,720**	**1008**	**84**	**256**
S52P	*	**551,601**	**934**	**94**	**273**
N9CIQ	*	**541,940**	**582**	**90**	**253**
W6JTI	*	**498,106**	**564**	**114**	**215**
OH5BM	*	**489,724**	**791**	**95**	**287**
GW4ALG	*	**486,595**	**1033**	**68**	**239**
GØDCK	*	**471,801**	**960**	**73**	**246**
W8AH	*	**458,626**	**608**	**105**	**224**
OK1VBA	*	**457,996**	**729**	**87**	**221**
G3YMC	*	**448,655**	**983**	**71**	**234**
DF1DX	*	**440,427**	**739**	**73**	**226**
K8ZT	*	**419,688**	**493**	**87**	**261**
EA7AAW	*	**417,924**	**758**	**63**	**184**
DF3AX	*	**394,085**	**812**	**75**	**218**
W7RAB	*	**379,680**	**521**	**91**	**189**
			(OP: KH7YD)		
ES1CW	*	**362,840**	**640**	**85**	**291**
JA2AXB	*	**362,088**	**597**	**102**	**180**
HAØGK	*	**353,100**	**753**	**70**	**205**
SP2EWQ	*	**313,248**	**496**	**86**	**226**
UU4J	*	**280,273**	**619**	**74**	**229**
			(OP: UU4JO)		
OH4ML	*	**259,425**	**526**	**81**	**250**
SP2HPD	*	**258,324**	**557**	**77**	**232**
DK6AJ	*	255,282	511	74	197
S59D	*	**237,958**	**643**	**82**	**240**
SM6CRM	*	**221,046**	**477**	**66**	**200**
UAØKCL/3	*	218,730	447	63	186
SM5NBE	*	218,080	502	72	218
OL3M	*	**217,830**	**703**	**61**	**204**
			(OP: OK1TGI)		
NU4B	*	212,173	329	63	184
IØZUT	*	**210,202**	**511**	**57**	**170**
LA5EKA	*	**202,950**	**522**	**58**	**188**
VA3DF	*	**201,740**	**418**	**57**	**163**
W8VE	*	193,192	352	68	180
N8IE	*	190,437	305	71	176
WD4GBW	*	183,012	342	41	161
EA3IW	*	173,448	408	58	158
UA4ARL	*	**166,866**	**360**	**74**	**200**
UA3AA	*	164,265	440	58	177
G4JZO	*	160,395	456	49	136
EA6/DL8NBY	*	**156,221**	**372**	**62**	**135**
WB8RTJ	*	150,336	287	59	157
DL1LAW	*	135,020	508	46	169
K2JT	*	**130,830**	**252**	**61**	**165**
ON7SS	*	**129,584**	**411**	**52**	**156**
OK1SI	*	125,716	491	46	166
OK1HCG	*	125,292	386	55	142
K3WWP	*	**120,771**	**226**	**51**	**138**
RK1NA	*	117,104	421	45	163
IØSKK	*	112,104	466	45	128
G4DBW	*	111,132	343	49	140
OM4W	*	**109,450**	**479**	**48**	**151**
			(OP: OM4KW)		
GM4HQF	*	**107,442**	**376**	**42**	**99**
HB9AYZ	*	**100,926**	**368**	**47**	**131**
RA4HBS	*	97,446	345	46	172
SP1KNM	*	90,336	287	65	153
			(OP: SP1RKT)		
RU2FM	*	**89,540**	**312**	**50**	**135**
ES8DH	*	85,095	306	48	135
WB6BWZ/4	*	82,948	221	60	118
K4ORD	*	78,888	197	52	100
SP9NSV	*	77,331	299	45	128
7S5Q	*	76,797	246	46	115
			(OP: SM5COP)		
PY3YD	*	**74,806**	**295**	**40**	**73**
LA8PV	*	73,260	275	47	138
OE3BCA	*	**73,248**	**276**	**53**	**115**
HB9HQX	*	64,622	372	31	127
DL1DQY	*	63,706	154	73	122
HB9DAQ	*	55,142	206	51	107
RV9COI	*	49,815	191	31	92
W2BVH	*	45,114	146	47	99
UR5FCM	*	41,846	234	27	95
N2JNZ	*	41,715	158	42	93
W9FHA	*	41,318	153	45	101
NS1W	*	40,764	140	39	90
PAØFAW	*	**39,730**	**276**	**34**	**111**
VE3AGC	*	38,442	196	51	78
LY3BY	*	37,740	273	23	88
YL2KF	*	**36,448**	**151**	**40**	**94**
KIØG	*	36,349	210	54	109
SP9RQH	*	35,990	191	40	78
SP4BOS	*	35,836	209	31	93
PA1B	*	31,743	229	26	87
RV3DBK	*	31,714	206	19	82
UX8IX	*	30,820	174	31	84
DL2ANM	*	29,400	197	25	96
K4GT	*	29,041	111	35	78
DF3SM	*	28,693	167	29	56
G4ZME	*	28,425	194	27	83
F5IQJ	*	26,462	160	92	75
AI2P/3	*	26,334	113	41	73
JA4DQX	*	23,868	143	48	60
WD7T	*	23,664	133	51	85
N7XY	*	22,892	89	39	58
UY2RZ	*	22,360	108	32	72
ON6QS	*	21,312	178	29	82
LX1NO	*	**20,176**	**99**	**39**	**65**
W5TVW	*	19,544	90	36	62
SP3BLT	*	19,502	96	36	62
SP1EK	*	17,751	126	29	68
N8XA	*	17,218	85	29	57
OZ6XR	*	**16,762**	**288**	**36**	**94**
EA5XQ	*	16,287	119	31	58
DL2BQD	*	13,600	96	33	52
W2JEK	*	13,558	78	37	54
VE3IGJ	*	13,255	126	28	27
EA2CAR	*	13,104	82	31	73
GM4SLV	*	12,556	83	29	44
EA2NA	*	11,529	320	41	142
KC8LTL	*	11,220	63	22	46
AA8IV	*	9,698	93	34	43
KN8J	*	8,160	64	23	37
USØYA	*	7,888	50	28	40
KB9YOZ	*	6,944	65	25	37
K3AS	*	5,940	49	17	37
G4ILO	*	5,920	69	16	24
DJ5QK	*	5,275	79	16	50
HB9OOZ	*	4,914	59	22	41
N2CQ	*	4,700	43	15	32
OK2NA	*	4,505	66	18	35
OK1DMP	*	4,293	55	31	50
DL9NEI	*	3,996	72	10	27
ON4ANE	*	3,795	98	21	48
SM6AHU	*	3,650	60	13	35
K3MZ/4	*	3,588	33	19	27
DL3BVA	*	3,010	41	14	29
YO4RLP	*	2,970	89	12	43
ZL2RVW	*	**2,100**	**42**	**16**	**26**
KD9B/4	*	1,632	19	15	19
UN7CM	*	1,365	20	15	20
DF5RF	*	1,152	25	9	9
SP6T	*	1,150	22	12	13
W4TLG	*	360	15	10	14
KE6CC	*	100	11	9	11
NG7Z	*	88	5	3	5
CX2AQ	**28**	**175,500**	**605**	**24**	**84**
HA7UG	*	**119,250**	**369**	**33**	**92**
YT7TY	*	**104,302**	**357**	**31**	**90**
JR3RWB	*	**90,331**	**342**	**33**	**70**
SP5DDJ	*	**83,733**	**305**	**33**	**80**
CE3DNP	*	**44,736**	**358**	**17**	**31**
SP9H	*	41,538	240	25	44
OH6NPV	*	**21,231**	**137**	**26**	**54**
EW6CU	*	**14,310**	**118**	**16**	**38**
WO2N	*	**11,077**	**80**	**15**	**38**
SN8M	*	10,041	87	20	37
			(OP: SP8MI)		
US3QW	*	**9,821**	**98**	**19**	**42**
JH1NXU	*	**9,747**	**86**	**21**	**32**
LZ1US	*	**5,289**	**201**	**10**	**22**
9A2KO	*	**4,750**	**84**	**17**	**21**
SQ9UM	*	3,904	60	14	18
HA8DL	*	2,117	35	13	18
KIØII	*	1,075

W6QU	*	**9,416**	**86**	**16**	**28**
			(OP: W8QZA)		
IZ1DFI	*	**7,083**	**114**	**8**	**39**
ES4MF	*	3,192	62	8	34
DL2WRJ	*	2,450	48	9	16
JF9JOD	*	1,404	32	12	14
OH2BEC	*	1,050	44	6	19
G4EDG	3.5	**66,270**	**515**	**18**	**76**
OL4W	*	**46,161**	**635**	**10**	**59**
			(OP: OK1IF)		
DL6MHW	*	**18,212**	**269**	**9**	**49**
OH7FF	*	**16,328**	**285**	**7**	**45**
RA3XAR	*	**9,152**	**171**	**9**	**43**
OM4APD	*	**2,706**	**101**	**5**	**28**
KR2Q	*	2,436	41	10	18
DL6UAA	*	1,116	24	7	24
JM1OZP/Ø	*	285	16	7	8
6YØA	1.8	**35,952**	**448**	**13**	**29**
			(OP: K2KW)		
SP4GFG	*	**9,635**	**243**	**5**	**36**
RZ4AA	*	**3,026**	**89**	**5**	**29**
VE3MGY	*	2,560	190	4	4
GWØVSW	*	**1,458**	**58**	**3**	**24**
VE3KZ	*	440	49	3	2
OK1DDV	*	312	24	3	10
G4CWH	*	306	29	3	15
N2AA	*	84	8	3	3
					(OP: KR2Q)

ASSISTED

NORTH AMERICA

UNITED STATES

KI1G	A	**8,310,372**	**4024**	**168**	**594**
W1AO	*	**3,094,802**	**1692**	**149**	**512**
N1DG	*	2,234,310	1204	145	518
K1JB	*	2,214,526	1399	134	443
W1NT	*	2,087,647	1540	115	406
W1NG	*	1,904,368	1086	149	507
NY1S	*	1,837,836	1462	104	355
N6RFM/1	*	1,776,658	1100	138	460
W1TO	*	1,748,537	1124	131	438
W1HR	*	1,581,880	1043	123	434
K2TE/1	*	1,558,980	1077	127	413
W1CSM	*	1,546,688	1009	126	446
W1EBI	*	1,405,512	1073	107	375
W1QK	*	1,337,904	1083	108	381
K1LD	*	1,104,090	874	119	375
W1RZF	*	971,827	810	108	359
AA1QD	*	909,606	724	118	356
K1RV	*	771,897	691	98	315
KW1DX	*	726,646	633	88	333
W2JU/1	*	635,481	587	95	298
K1TH	*	580,318	611	89	269
K1TR	*	566,773	579	94	295
K1MZ	*	494,845	548	86	245
KG1D	*	487,432	549	89	293
K1JN	*	476,316	448	93	311
N1AU	*	473,110	441	104	287
NC1N	*	444,460	520	75	238
W1JR	*	329,475	388	101	244
W1NK	*	306,848	333	82	262
W1DAD	*	304,326	357	75	244
W1EL	*	292,164	364	64	227
W1EZ	*	143,000	240	53	167
W1AW	*	125,745	273	72	177
				(OP: N1ND)	
K1TW	*	125,255	224	71	134
NJ1F	*	90,522	208	68	146
W1AZ	*	77,328	155	68	148
W1ZR	*	72,512	199	51	125
K1AE	7	13,260	70	13	55
K2NG	A	**5,163,202**	**2335**	**177**	**637**
N2MM	*	**3,941,552**	**2230**	**147**	**527**
NA2U	*	3,531,250	2071	137	488
W2WB	*	3,455,650	1999	148	523
NO2R	*	3,110,106	1648	164	563
AB2E	*	2,239,640	1459	127	457
K2ONP	*	2,081,472	1334	137	449
N2WK	*	1,776,830	1025	148	490
K2SG	*	1,712,836	1422	105	352
N2NI	*	1,632,631	1155	123	416
KA2D	*	1,239,520	905	115	393
AK2P	*	1,154,044	1286	119	407
K2EP	*	1,055,600	740	124	396
K2XF	*	966,888	800	106	362
N2BA	*	915,317	860	88	301
W6XR/2	*	883,115	669	119	390
AJ3K/2	*	849,408	735	110	364
W2LE	*	820,530	741	101	304
N1RK/2	*	811,456	708	91	318
N2TK	*	699,246	483	134	429
NY6DX/2	*	671,656	615	111	361
N2ED	*	638,320	758	98	297
N2NL	*	612,704	512	122	345
K2GN	*	596,939	615	88	283
W2YR	*	559,800	476	117	333
K2BX	*	480,822	490	88	293
K2OWE	*	454,528	550	98	326
W2RD	*	433,062	376	107	334
AA2MF	*	354,308	411	100	304
WR2I	*	330,484	413	71	237
N2FF	*	220,454	329	68	210
K2PF	*	147,180	269	64	159
WB2TPS	*	133,783	209	74	177
K2BM	*	117,165	204	69	150
N2AB	*	61,455	248	15	70
KD2HE	*	50,050	186	43	111
N1JP/2	*	32,637	98	38	91
K2QPN	*	15,996	61	40	53
KF2O	*	2,400	22	19	21
N2CU	*	24	2	2	2
N1EU/2	1.8	1,632	23	11	21
W2UP/3	A	**7,740,825**	**3842**	**157**	**568**
K3WW	*	**6,453,570**	**3495**	**154**	**536**
K3OO	*	**5,152,256**	**2701**	**155**	**539**
K3PH	*	3,311,016	1872	140	496
KQ3F	*	2,878,798	1979	129	397
W3FV	*	2,662,632	1623	127	460
N3NA	*	2,592,052	1630	130	433
N3AM	*	2,203,758	1442	133	440
K3NO	*	1,727,740	1081	138	436
WE3C	*	1,577,268	891	156	537
K3NZ	*	1,445,964	941	131	467
NN3Q	*	1,327,445	1044	116	369
K3CP	*	1,305,390	931	125	405
K3SV	*	1,273,048	927	109	399
W3HVQ	*	1,054,170	841	124	406
W3CF	*	1,043,058	822	122	404
N3ZA	*	1,020,544	706	122	414
N3KN	*	1,001,250	813	99	346
N3ED	*	678,084	684	110	357
W3IQ	*	649,873	685	81	272
K3NM	*	574,816	474	118	388
KB3TS	*	509,614	493	94	315
KB3MM	*	473,162	557	87	272
W3PT	*	381,045	466	98	301
K3CT	*	268,554	359	81	205
K3PD	*	259,164	344	87	226
AA8CY/3	*	220,869	332	67	186
WA3KYY	*	200,406	329	67	196
W3FVT	*	167,090	342	67	178
W3UTD	*	125,756	295	54	157
KU3X	*	113,524	212	56	146
KQ3V	*	90,354	162	67	155
W3OU	*	86,320	176	70	138
W3LJ	*	67,200	148	52	123
WR3Y	*	38,824	225	51	133
W3EA	*	31,376	202	33	115
AA3TL	*	16,836	126	34	58
NZ3O	*	15,792	61	37	57
K5KG/4	A	**3,657,040**	**2015**	**156**	**524**
W4MYA	*	**2,802,080**	**1601**	**156**	**508**
K3KO/4	*	**1,981,776**	**1134**	**142**	**494**
K1PT/4	*	1,935,738	1304	135	434
NI1N/4	*	1,606,928	1115	123	413
K4SV	*	1,288,876	917	125	417
N4VV	*	1,022,417	840	117	334
AA4NN	*	1,005,242	980	102	311
W3YY/4	*	803,815	678	112	319
K4WW	*	633,465	776	86	229
N4GG	*	486,420	457	103	299
W4ZW	*	334,803	453	84	237
AA4NO	*	306,719	405	78	223
AA4V	*	270,692	439	73	163
N4XM	*	209,475	311	96	189
W4HJ	*	191,436	346	87	214
W4ARM	*	176,715	318	65	166
AD4IE	*	141,330	277	54	156
K4SB	*	126,450	236	93	188
KU3O/4	*	104,696	268	56	128
KD4SN	*	91,590	165	69	146
KC4HW	*	32,130	98	37	89
W4ATL	*	16,116	82	22	57
K4WES	*	6,084	47	31	47
W4WNT	*	5,445	78	36	63
K4EA	28	**326,120**	**850**	**33**	**122**
N4GM	*	277,095	712	33	114
NQ4I	21	**562,870**	**1295**	**37**	**133**
K5NA	A	**2,310,384**	**1179**	**184**	**578**
W5ZO	*	**1,145,430**	**969**	**135**	**360**
N5JR	*	700,756	643	101	305
K5GH	*	474,823	501	118	339
N5AU	*	464,580	502	103	245
W5ZL	*	425,785	498	103	232
W5GAI	*	400,488	472	99	229
NØRQ/5	*	32,760	101	45	85
KB5SSJ	*	100	43	34	34
N5ER	7	17,708	124	16	60
AF5Z	3.5	9,519	66	20	37
NX5M	1.8	**4,173**	**49**	**13**	**26**
WØYK/6	A	**1,717,344**	**1303**	**157**	**377**
K6XX	*	**1,648,592**	**1249**	**140**	**353**
K6XT	*	1,417,926	972	150	412
N6CW	*	1,240,282	868	138	376
N6WS	*	576,711	531	129	288
W6TK	*	528,000	539	120	264
K6RIM	*	500,610	489	118	289
AB6WM	*	495,880	527	110	275
N6IC	*	313,854	421	100	189
NI6T	*	229,320	296	115	200
NW6P	*	163,386	275	92	169
W7SW/6	*	139,689	292	68	119
KI6T	*	113,696	229	76	111
W6SC	*	97,983	187	66	125
K6OWL	*	81,792	221	63	81
N6EM	*	59,594	171	71	95
N6XI	*	44,916	146	47	67
WF6C	*	33,800	105	47	83
				(OP: N6XI)	
K6DGW	*	6,720	48	23	37
K6EP	*	3,182	27	20	23
W6RKC	7	22,578	128	27	44
W7UT	A	**1,212,237**	**929**	**143**	**364**
W7RN	*	**815,184**	**698**	**122**	**310**
				(OP: K5RC)	
W7VV	*	637,112	681	116	251
KO7X	*	571,914	587	109	269
K7XZ	*	356,400	390	97	263
				(OP: K1MY)	
K7GQ	*	347,616	424	97	209
K7ZD	*	248,703	353	90	183
N7OR	*	214,500	316	80	180
K7BG	*	189,202	320	78	169
N7ON	*	104,319	206	84	117
N7JB	*	76,773	175	77	86
W7ZR	*	47,700	130	69	90
AA7A	14	**219,024**	**488**	**36**	**126**
N6SS/7	7	**205,920**	**498**	**37**	**119**
N7BV	*	52,318	233	29	72
N9AG/8	A	**3,291,255**	**1910**	**162**	**509**
ND5S/8	*	**1,877,260**	**1110**	**150**	**494**
K8AJS	*	1,247,696	1006	103	361
N8RA	*	1,201,212	825	128	419
KF8HR	*	1,112,393	943	107	354
N4ZR/8	*	733,221	823	78	239
WB8ZRL	*	233,320	285	96	211
K8YC	*	231,410	280	83	234
N8TR	*	216,482	249	91	238
NO8C	*	191,540	299	73	171
K8LN	*	96,839	206	58	121
WC8VOA	*	25,134	116	41	77
N9CK	A	**2,416,320**	**1497**	**141**	**435**
WE9V	*	**1,882,884**	**1311**	**134**	**400**
W9MU	*	1,589,980	1096	136	438
K9IG	*	1,202,590	927	115	367
K9MM	*	1,114,864	901	123	349
K9UQN	*	1,101,012	961	107	311
K9RS	*	945,896	673	132	400
N2BJ/9	*	588,465	575	105	300
K9OR	*	542,080	515	102	283
K9CS	*	496,296	529	98	268
N9SW	*	481,536	524	93	259
K9OSH	*	370,980	456	97	227
N9QQK	*	366,660	457	81	234
W9OL	*	213,000	343	68	182
KF9YR	*	171,684	268	71	180
N9BOR	*	107,139	232	70	143
AF9R	*	84,624	196	55	109
K9TTT	*	100	46	27	42
N9AU	7	**171,797**	**439**	**35**	**114**
W9IND	3.5	**30,156**	**153**	**23**	**61**
KØKX	A	**3,120,365**	**1740**	**160**	**499**
KU1CW/Ø	*	**2,572,668**	**1711**	**146**	**435**
AE9B/Ø	*	1,331,200	1081	133	387
N5IN/Ø	*	874,740	710	129	349
KØUK	*	538,720	588	136	280
K8FC/Ø	*	513,712	595	110	278
KØIR	*	492,788	543	97	252
NØIM	*	482,760	485	113	292
NØIJ	*	440,860	514	79	256
KTØR	*	392,232	443	97	257
NØBUI	*	260,064	378	65	187
KIØF	*	233,478	366	93	234
WØTT	*	230,762	339	91	220
KØOB	*	200,600	258	91	204
WØRK	*	170,022	288	83	175
WØVD	*	168,942	308	72	150
NØHJZ	*	157,550	229	81	193
KØBX	*	126,600	242	53	147
ACØW	*	82,270	187	65	125
KCØLBT	*	70,135	182	56	113
WØAMT	*	52,650	150	55	95
K4IU/Ø	*	49,319	127	53	96
NFØN	*	43,440	129	39	81
AAØBA	*	9,315	50	30	39
KVØQ	7	**249,920**	**639**	**36**	**124**

BARBADOS

8P6SH	A	**390,937**	**560**	**91**	**222**

CANADA

VE7UF	A	**1,413,750**	**1629**	**127**	**250**
VA6XDX	*	**325,119**	**517**	**100**	**203**
				(OP: VE6LB)	
VE2WU	*	32,895	297	34	95
VE3ZI	1.8	**52,164**	**432**	**16**	**47**

CAYMAN ISLANDS

ZF2NT	A	**6,393,842**	**5242**	**147**	**412**

MEXICO

XE2AC	A	**820,456**	**1194**	**104**	**260**

U.S. VIRGIN ISLANDS

WP2Z	A	**7,083,960**	**5437**	**144**	**426**

AFRICA

ANTARCTICA

DP1POL	A	**127,558**	**388**	**36**	**82**
				(OP: DL5XL)	

CANARY ISLANDS

EA8NQ	14	**160,398**	**456**	**31**	**95**

TUNISIA

3V8BB	A	**10,992,800**	**5586**	**165**	**563**
				(OP: YT1AD)	

ASIA

ASIATIC RUSSIA

RG9A	A	**6,226,400**	**3382**	**169**	**555**
				(OP: UA9AM)	
RN9RZ	*	583,975	671	89	266
RN9XA	*	149,532	277	58	146
UA9UR	21	**56,268**	**229**	**25**	**83**
RA9AC	14	**104,430**	**330**	**33**	**85**
RSØF	A	**1,378,260**	**1341**	**147**	**318**
UAØSC	*	341,897	676	78	151
UAØQBR	*	335,312	459	91	213
RUØAE	*	155,805	364	69	126
RAØLQ	*	12,276	57	37	56
RUØAT	14	**280,308**	**959**	**34**	**107**
RMØA	3.5	**228,056**	**941**	**27**	**89**
				(OP: UAØANW)	
UAØAGI	1.8	**31,122**	**325**	**18**	**45**

ASIATIC TURKEY

TA2ZF	A	**6,650,040**	**4241**	**141**	**463**
				(OP: UT3UA)	

CHINA

B4RF	7	**240,520**	**1177**	**34**	**105**
				(OP: BA4RF)	

CYPRUS

C4M	A	**10,386,444**	**5177**	**181**	**623**
				(OP: RW3QC)	

GEORGIA

4L8A	14	**862,575**	**2089**	**35**	**124**

JAPAN

JH4IFF	A	**2,684,500**	**2063**	**157**	**343**
JF2SKV	*	**415,140**	**559**	**116**	**214**
JA1XUY	*	284,070	444	89	166
JJ1BDX/3	*	242,554	395	92	155
JI1CQA	*	122,250	300	57	93
JE2HCJ	*	30,849	108	50	63
JK2VOC	*	14,040	83	42	48
JA2VQF	*	3,053	42	32	39
JH9VSF	28	**171,598**	**597**	**35**	**84**
JH9KVF	21	**229,886**	**675**	**35**	**102**
JM1NKT	*	182,508	512	33	101
JH4UTP	7	**103,845**	**486**	**30**	**75**
JF2VAX	*	48,416	227	28	61
JA1IZZ	3.5	594	26	12	15

EUROPE

4U-GENEVA

4U1ITU	7	**1,089,441**	**3648**	**37**	**134**
				(OP: OM3CGN)	

AUSTRIA

OE8CIQ	A	**1,331,976**	**1731**	**138**	**378**
OE3II	28	**268,454**	**880**	**38**	**103**
				(OP: OE1DSA)	
OE3ZK	14	**159,385**	**785**	**32**	**95**

BELARUS

EU1SA	7	**100,386**	**500**	**30**	**87**
EU1AZ	3.5	**219,780**	**1476**	**28**	**82**

BELGIUM

ON4UN	A	**4,805,560**	**3263**	**160**	**520**
				(OP: DL2CC)	
ON5ZO	*	790,834	1353	85	264
ON4CAS	*	373,451	723	72	227
ON4BBD	28	**121,275**	**555**	**31**	**74**
ON4APU	14	**149,330**	**641**	**34**	**103**
ON4ATW	3.5	**181,478**	**1151**	**26**	**87**

BOSNIA-HERZEGOVINA

T95A	A	**1,011,561**	**1595**	**101**	**346**
T9/9A3GZ	1.8	**114,962**	**1175**	**18**	**76**

BULGARIA

LZ2BE	A	**458,496**	**710**	**101**	**297**
LZ1YY	*	48,195	181	48	87

CROATIA

9A1P	21	**667,584**	**1842**	**38**	**133**
9A5Y	3.5	**360,591**	**1704**	**35**	**112**
				(OP: 9A3NM)	

CZECH REPUBLIC

OK2FD	A	**3,109,848**	**2073**	**170**	**579**
OK2ZJ	*	481,510	847	91	267
OK1DXW	*	182,413	379	71	182
OK1KT	28	**89,748**	**319**	**31**	**77**
OK1MD	21	**332,486**	**991**	**36**	**118**
OK2AP	*	45,360	234	28	80
OK1DG	7	**379,134**	**1314**	**36**	**117**

DENMARK

OZ8F	A	**197,792**	**569**	**56**	**168**
OZ4O	3.5	**124,845**	**917**	**21**	**84**

ENGLAND

G3UHU	A	**14,184**	**96**	**27**	**45**
G4IFB	21	**405,978**	**1360**	**32**	**110**
G5LP	7	**438,344**	**1969**	**36**	**121**

ESTONIA

ES5QX	21	**685,950**	**1865**	**37**	**133**
ES5MC	14	**900,930**	**2421**	**38**	**139**
ES5RY	7	**515,200**	**1773**	**39**	**136**

EUROPEAN RUSSIA

RZ3AZ	A	**3,015,372**	**2562**	**155**	**553**
RF4R	*	**2,837,997**	**2268**	**170**	**559**
				(OP: UA4RC)	
RM3C	*	**2,069,376**	**1918**	**138**	**496**
RU4WW	*	1,400,496	1906	125	412
RX4HZ	*	767,340	864	126	396
RK3BA	*	377,816	905	81	251
RZ3DJ	*	291,824	614	78	221
UA4HJ	*	284,790	621	83	247
RU3DX	*	266,923	686	69	224
UA3AB	*	221,832	367	111	205
RK6BZ	*	166,060	491	51	179
RW4WZ	*	110,475	252	71	154
RU3AT	*	11,858	68	37	61
RA6CM	7	**654,066**	**2219**	**38**	**136**
RV6ASU	3.5	**24,336**	**233**	**14**	**58**
UA6LV	1.8	**100,498**	**651**	**26**	**83**
RW4PL	*	81,498	627	24	78
RU6YY	*	7,020	112	11	41

FINLAND

OH6NIO	A	**3,969,010**	**2280**	**161**	**569**
OH6Y	*	**2,047,860**	**1551**	**136**	**484**
				(OP: OH6YF)	
OH4RH	*	1,727,760	1675	133	419
OH2CI	*	237,708	431	78	206
OH2EV	*	135,568	391	63	166
OH4MDY	14	**303,380**	**1516**	**37**	**117**
OH3BU	3.5	6,394	114	8	38
OH2BO	1.8	**31,493**	**352**	**14**	**63**

FRANCE

TM5A	A	**271,931**	**409**	**110**	**309**
				(OP: F5VHJ)	
F6IFY	*	65,728	280	46	112
F5IN	28	**385,678**	**1081**	**36**	**122**

GERMANY

DL6FBL	A	**6,092,800**	**3516**	**175**	**625**
DL1IAO	*	**4,659,020**	**2881**	**173**	**599**
DF3CB	*	**4,226,052**	**2527**	**168**	**594**
DK3GI	*	3,544,216	2311	169	520
DFØFS	*	1,453,200	1557	113	406
				(OP: DL1EKC)	
DL7BY	*	1,417,962	1479	123	423
DK5IM	*	948,092	1330	92	329
DL4CF	*	796,875	1071	107	318
DL2MDU	*	632,100	756	114	316
DL6KVA	*	582,802	543	127	322
DL6NCY	*	564,450	689	102	324
DL2RMC	*	462,528	706	95	257
DK1MAX	*	454,157	521	119	332
DL8KJ	*	438,275	668	96	277
DL8DYL	*	434,600	601	94	234
DL6KWU	*	428,694	616	92	262
DL8KAW	*	378,879	699	74	249
DL5KUA	*	363,475	536	91	244
DJ8RS	*	323,449	474	103	240
DHØGHU	*	315,944	556	86	206
DL4RCK	*	223,660	431	76	189
DL1GGT	*	220,720	486	74	174
DL2DBS	*	215,390	578	57	181
DK2ZO	*	201,231	422	65	196
DH5HV	*	176,715	387	67	164
DL9NDV	*	141,192	279	68	144
DL8DWW	*	110,815	333	54	131
DK5WL	*	96,015	259	60	113
DL9DRA	*	88,704	189	78	146
DL2OBO	*	82,620	215	68	136
DL6JZ	*	58,500	174	59	91
DF2AP	*	50,320	204	41	95
DJ8QP	*	46,345	164	49	106
DL3ARK	*	44,697	250	27	114
DL5NDX	*	31,613	171	28	73
DM3PKK	*	21,484	98	33	49
DLØTU	*	11,480	64	35	47
DL6KAC	*	6,549	39	25	34
DF9ZP	21	**572,544**	**1545**	**38**	**130**
				(OP: DK8ZB)	
DH7KU	*	357,870	1137	35	116
DJ2RG	*	17,136	357	31	81
DL5ZL	7	**374,880**	**1600**	**36**	**124**
DF9OX	3.5	**134,715**	**899**	**24**	**81**
DK2GZ	1.8	**50,025**	**608**	**17**	**70**
DJ1MM	*	33,799	471	11	62

GREECE

SV1ENG	A	**186,588**	**939**	**40**	**102**

HUNGARY

HAØHW	A	**1,490,976**	**1780**	**118**	**383**
HA5PT	*	1,072,467	1347	109	362
HA1AG	*	140,835	313	78	151
HG5C	28	**385,287**	**1256**	**35**	**112**
				(OP: HA1AD)	
HG9X	14	455,911	1566	38	125
				(OP: HA9PP)	
HA5A	3.5	**148,482**	**1478**	**27**	**86**
				(OP: HA6GK)	

ITALY

IR2A	A	**2,234,160**	**3287**	**85**	**236**
IKØYVV	*	**1,912,850**	**1620**	**149**	**422**
IK2AHB	*	869,582	1317	83	264
I2SVA	*	867,468	889	118	365
IR2K	*	173,242	595	56	138
				(OP: IK2HKT)	
IC8POF	*	91,494	232	65	156
IK2SAE	*	13,736	130	27	74
IK2GZU	28	**226,348**	**693**	**36**	**106**
IK3UNA	21	**450,747**	**1485**	**37**	**120**
I1NVU	*	186,030	650	35	100
IU2M	7	**389,407**	**1282**	**38**	**125**
				(OP: I2WIJ)	
IK2CIO	*	338,575	1183	36	109
IV3IYH	3.5	**208,498**	**1349**	**29**	**93**

LATVIA

YL8M	A	**5,322,744**	**4589**	**162**	**546**
				(OP: YL2KL)	
YL2KA	*	853,024	874	118	319
YL2LY	3.5	**151,866**	**1055**	**27**	**90**

LITHUANIA

LY2BVB	A	27,007	106	41	72

NETHERLANDS

PG3N	A	**692,360**	**968**	**94**	**286**
PF5X	*	353,472	532	87	176
PAØJED	21	**203,582**	**701**	**32**	**105**

NORTHERN IRELAND

GI4XSF	7	7,872	103	10	38

NORWAY

LA3S	A	**1,528,618**	**1861**	**98**	**356**
				(OP: LA3BO)	
LA3R	*	1,128,596	1301	106	370
				(OP: LA5LJA)	
LA6IHA	*	764,784	996	101	322
LA5LJA	*	1,305	15	14	15

POLAND

SN8F	A	**3,129,329**	**2883**	**148**	**475**
				(OP: SP8FHK)	
SP9VEG	*	62,832	189	53	101
SP9RPW	*	4,814	36	24	34
SP9W	28	**307,314**	**930**	**37**	**125**
SP3GXH	*	45,034	204	31	58
SO2R	14	**1,048,407**	**2873**	**39**	**144**
SP6GCU	*	390,260	1339	34	124
SN5Z	*	213,150	796	35	112
				(OP: SP5UAF)	
SP4Z	7	**735,300**	**2259**	**39**	**132**
SN3A	3.5	**344,304**	**1716**	**33**	**111**
				(OP: SP3HLM)	
SP6EKS	1.8	**42,822**	**530**	**13**	**65**
SO6A	*	4,650	191	6	44
				(OP: SP6IHE)	

PORTUGAL

CT1GFK	3.5	**70,864**	**451**	**19**	**84**

SCOTLAND

MMØQ	28	**8,126**	**107**	**11**	**23**
				(OP: MMØBQ

UU7J	**28**	**401,720**	**1238**	**38**	**128**
			(OP: UUØJX)		
U5WF	**21**	**221,852**	**720**	**35**	**121**
UW5Q	**7**	**714,267**	**2282**	**38**	**133**
UT7UJ	**3.5**	**111,615**	**897**	**24**	**81**
UUØJM	*	39,360	378	15	65
		WALES			
GWØGEI	**A**	**1,742,481**	**2072**	**109**	**368**
		YUGOSLAVIA			
4N1N	**28**	**203,604**	**798**	**34**	**107**
			(OP: 4N1NW)		
YU1QW	*	110,694	437	31	83
YT5A	**21**	**581,480**	**1567**	**37**	**131**
YT1BB	**14**	**390,112**	**1722**	**39**	**128**
YZ7A	**1.8**	**74,124**	**911**	**16**	**71**
			(OP: YU7CM)		

OCEANIA

		AUSTRALIA			
VK1AA/4	**7**	**437,970**	**1251**	**33**	**97**
		HAWAII			
AH6NF	**A**	**13,667**	**71**	**39**	**40**
		NEW ZEALAND			
ZL3GA	**A**	**25,116**	**119**	**41**	**50**

SOUTH AMERICA

		ARGENTINA			
LU4DX	**28**	**963,677**	**2358**	**31**	**112**
			(OP: LU5DX)		
		BRAZIL			
PQ2Q	**A**	**4,039,740**	**2649**	**140**	**400**
			(OP: PY2NDX)		
ZZ8Z	*	1,649,522	1914	99	314
			(OP: PY8AZT)		
PY3CQ	**21**	**390,424**	**1071**	**34**	**114**

MULTI-OPERATOR SINGLE TRANSMITTER

NORTH AMERICA

	UNITED STATES			
K1KI	**9,893,408**	**4533**	**178**	**634**
K1IR	**8,122,368**	**4093**	**169**	**599**
W1US	6,418,215	3325	164	575
W1NR	988,281	651	139	428
W7DXX/1	984,294	1209	90	277
W1BIH	569,296	557	118	358
W1FM	83,700	197	63	123
N2RM	**2,220,327**	**1917**	**106**	**317**
N2LBR	**1,661,390**	**1155**	**118**	**397**
W2CG	1,073,950	871	114	356
W2YC	1,024,896	782	126	418
WA2UBK	641,901	574	110	343
NJ2OM	56,156	301	64	138
N3RS	**8,839,530**	**4083**	**184**	**526**
W3GG	**2,775,495**	**1842**	**141**	**474**
NE3F	1,668,282	1454	118	365
NB3O/4	**277,058**	**372**	**92**	**225**
W5VX	**2,380,510**	**1617**	**154**	**492**
WS6X	**498,666**	**512**	**123**	**260**
W7VJ	**1,866,280**	**1529**	**151**	**330**
K8AZ	**7,510,536**	**3606**	**183**	**600**
NØFW/8	3,374,629	1996	164	549
K8JM	1,903,028	1282	142	454
WØSOC	10,366	65	24	47
	4U-UNITED NATIONS			
4U1UN	**347,580**	**980**	**57**	**123**
	ANTIGUA			
V26DX	**1,719,622**	**2464**	**77**	**236**
	CANADA			
VE7SV	**5,371,372**	**4153**	**172**	**432**
VE7GL	**4,842,504**	**3867**	**152**	**412**
VE3DC	**2,119,284**	**2216**	**107**	**315**
VE3RM	1,660,386	1401	132	414
VE6AO	**1,639,491**	**2236**	**116**	**283**
VC4X	**899,424**	**1538**	**92**	**196**
VE2UMS	334,956	700	76	195
	GUATEMALA			
TGØAA	**7,474,656**	**5897**	**143**	**445**
	JAMAICA			
6Y5X	**5,689,708**	**5468**	**130**	**361**
	TURKS & CAICOS ISLANDS			
VP5X	**8,333,270**	**6384**	**148**	**457**

AFRICA

	JUAN DE NOVA & EUROPA			
TO4WW	**4,413,609**	**3882**	**118**	**325**
	MADEIRA ISLANDS			
CT3/OL8R	**5,685,240**	**4245**	**100**	**372**

ASIA

	ASIATIC RUSSIA			
RT9W	**9,366,175**	**4478**	**173**	**632**
RW9C	**5,848,150**	**3412**	**156**	**526**
RF9C	4,622,136	2623	157	539
RK9CZO	3,342,762	2100	146	472
RK9JWV	2,130,224	2042	114	350
RK9CWB	1,935,450	2074	106	319
RW9OWD	1,868,504	2018	94	280
	ASIATIC TURKEY			
TA3/DK3KD	**1,129,436**	**1544**	**64**	**244**
	CAMBODIA			
XU7ACZ	**5,292,474**	**4399**	**153**	**408**
	CYPRUS			
P3A	**18,944,576**	**8323**	**191**	**672**
	JAPAN			
JA7YAA	**4,928,980**	**2913**	**179**	**467**
JA1YPA	**1,873,536**	**1642**	**153**	**323**
JA1YSS	55,120	177	50	80
JA7YAF	5,248	42	32	32
	JORDAN			
JY8YB	**8,220,768**	**4996**	**147**	**461**
	KAZAKHSTAN			
UN7PV	1,551	25	12	21
	KOREA			
DS0DX	**1,205,124**	**1994**	**117**	**231**
	UNITED ARAB EMIRATES			
A61AJ	**16,487,793**	**7199**	**195**	**682**
	VIETNAM			
XV2NA	**1,364,440**	**2136**	**122**	**263**
	WEST MALAYSIA			
9M4JB	**672,944**	**1091**	**97**	**210**

EUROPE

	AUSTRIA			
OE2S	**7,458,240**	**4834**	**176**	**640**
	BALEARIC ISLANDS			
EA6IB	**11,016,387**	**6548**	**189**	**684**
	BELGIUM			
OR3P	**1,264,420**	**2234**	**91**	**291**
OR3R	118,816	554	49	139
	BOSNIA-HERZEGOVINA			
T91EDK	3,160	136	7	33
	BULGARIA			
LZ1ABC	**2,463,054**	**2675**	**127**	**430**
	CROATIA			
9A8MM	**267,232**	**841**	**61**	**163**
	CZECH REPUBLIC			
OK5W	**8,894,880**	**4796**	**192**	**672**
OL7R	**5,827,482**	**3859**	**173**	**596**
OK1KZE	**2,115,445**	**2240**	**132**	**373**
OL1C	1,927,200	2479	110	330
OL3W	1,347,456	1635	115	369
OL2U	1,282,176	1944	108	324
OK1KDO	925,567	1256	102	307
OL9S	635,579	1147	79	264
OL2A	586,131	1006	75	198
OK2KCN	121,475	629	24	89
OK5SWL	19,550	130	28	87
	ENGLAND			
G5W	**7,796,540**	**4925**	**174**	**608**
G6PZ	**5,064,300**	**4269**	**148**	**514**
M2A	4,008,873	4134	150	499
G6M	1,982,040	2887	120	378
G5X	745,331	1437	76	213
	EUROPEAN RUSSIA			
RL3A	**6,792,656**	**4423**	**197**	**687**
RF3A	**4,266,390**	**3891**	**156**	**554**
RX3RXX	3,046,175	3539	144	461
RZ1QZZ	2,527,786	2471	150	481
RZ6HWA	2,433,699	2390	144	477
RD3R	2,130,450	2502	120	405
RK3SWB	974,088	1344	119	379
RK4CWA	972,036	1569	108	360
RK4WWA	927,908	1575	108	350
RK4UWA	822,075	1293	116	369
RK6AYN	653,763	1158	83	280
RD3A	596,106	1954	37	134
			(OP: RD3AF)	
RK3DZV	432,106	892	87	271
RK1NWA	229,320	604	63	217
	FINLAND			
OH7M	**7,190,534**	**4013**	**178**	**619**
OH5Z	**5,473,704**	**3546**	**177**	**609**
OH6BG	856,076	2333	36	127
	FRANCE			
TM2Y	**9,250,239**	**5112**	**186**	**657**
F8BPN	1,786,428	2264	118	341
F6CEL	1,297,960	2069	95	275
F6KJX	260,333	968	49	142
TM5HV	118,503	372	56	153
	GERMANY			
DJ4AX	**9,009,504**	**4775**	**190**	**671**
DLØOV	3,370,788	2624	152	556
DF1LX	3,058,209	2535	158	535
DLØDX	2,413,320	2255	122	424
DKØRE	751,247	1115	96	317
DKØFFO	717,340	1067	98	305
DLØMB	153,153	378	61	170
	HUNGARY			
HG1S	**8,329,158**	**5196**	**189**	**645**
HG8U	1,536,210	2229	102	288
HG8N	1,264,110	2159	102	333
HA6KZS	154,645	518	59	138
	ITALY			
IR4X	**9,243,954**	**4806**	**189**	**678**
	LITHUANIA			
LY1YK	**2,914,413**	**3302**	**158**	**565**
	LUXEMBOURG			
LX7I	**6,527,099**	**4718**	**163**	**568**
	NETHERLANDS			
PI4DEC	**4,029,172**	**3245**	**146**	**528**
	NORWAY			
LN8W	**7,407,064**	**5021**	**185**	**627**
LA1K	248,746	617	61	216
	POLAND			
SP6KFA	**443,193**	**1120**	**59**	**232**
SP9KRT	398,808	957	80	268
SP9ZHR	305,081	546	78	209
SP9KJU	46,704	198	41	98
SP9KJT	45,326	213	40	91
SP9PZU	41,676	221	36	102
	ROMANIA			
YO6KNY	136,138	427	60	184
	SLOVAK REPUBLIC			
OM7M	**9,326,068**	**5126**	**199**	**709**
OMØM	**7,434,648**	**4633**	**190**	**656**
OM5M	4,115,328	3340	150	522
OM4A	2,179,125	2637	105	342
OM3KVW	37,398	164	44	94
	SPAIN			
EA7NK	**1,856,547**	**2287**	**97**	**326**
EA2CMY	1,102,672	1677	95	302
	SWEDEN			
8S2F	**5,863,920**	**3942**	**180**	**615**
SJ5AA	2,196,960	2455	133	454
SI9AM	1,784,892	2679	107	339
	UKRAINE			
UT7M	**4,222,680**	**4010**	**160**	**500**
UT7L	2,905,632	2564	159	525
UR4PWC	983,353	1325	97	316
UR6GWZ	670,761	1434	73	278
UR4LWY	533,253	872	89	290
UR4LWA	191,295	938	43	152
UT7AXA	23,400	196	25	79
	YUGOSLAVIA			
YZ1ZA	**622,430**	**1333**	**86**	**249**

OCEANIA

	GUAM			
AH2R	**8,748,047**	**4625**	**182**	**515**
	PHILIPPINES			
DX1MK	56,749	388	23	54

SOUTH AMERICA

	ARGENTINA			
LU7DW	**1,688,481**	**1607**	**105**	**282**
	BRAZIL			
PY3MHZ	1,575	28	5	16

MULTI-OPERATOR TWO TRANSMITTER

NORTH AMERICA

	UNITED STATES			
KØTV/1	**6,756,848**	**3728**	**146**	**542**
W1SRG	1,566,158	1194	120	394
N3AD	**8,983,955**	**4960**	**178**	**575**
K3DI	2,607,923	1657	144	487
K4JA	**13,644,240**	**6088**	**183**	**635**
N4RV	**8,260,674**	**4186**	**167**	**576**
N4WW	6,801,056	3532	167	584
W6YX	**4,058,216**	**2620**	**157**	**427**
W6NV	3,192,885	2099	164	439
W8ZA	**2,752,360**	**1651**	**146**	**486**
NØNI	**7,233,908**	**3714**	**180**	**568**
	CANADA			
VE3EJ	**14,545,882**	**7457**	**184**	**622**
VE3YAA	1,717,900	2045	106	304
VE7ZZZ	1,374,233	2055	113	216
	COSTA RICA			
TI5N	**9,771,300**	**7087**	**168**	**525**
	ST. KITTS & NEVIS			
V47KP	**11,331,236**	**7097**	**163**	**558**

AFRICA

	CANARY ISLANDS			
EA8AX	**5,717,600**	**3639**	**120**	**440**
	MADEIRA ISLANDS			
CT9L	**24,874,181**	**10942**	**175**	**636**
	TUNISIA			
TS7N	**20,952,297**	**9631**	**173**	**610**

ASIA

	ASIATIC RUSSIA			
RN9WWW	**3,760,576**	**2813**	**125**	**411**
	JAPAN			
JA1ZLO	**2,379,741**	**2225**	**150**	**333**
JA6ZPR	1,479,868	1825	129	253
	KAZAKHSTAN			
UP5G	**11,693,784**	**6796**	**176**	**588**

EUROPE

	BELGIUM			
OT3L	**8,208,200**	**6076**	**172**	**598**
	CROATIA			
9A7A	**13,486,218**	**8395**	**187**	**679**
	DENMARK			
OZØKR	**409,726**	**1007**	**80**	**269**
	EUROPEAN RUSSIA			
RU1A	**16,533,164**	**8314**	**209**	**749**
	FRANCE			
F8KGH	**477,100**	**980**	**82**	**285**
	GERMANY			
DLØCS	**9,498,178**	**5573**	**196**	**667**
DJ5IW	**9,275,748**	**5700**	**182**	**622**
DK3WW	6,582,876	4736	170	612

Thomas, OZ1AA, was Single Op, All Band, High Power, #2 Denmark, from the OZ5E station.

DAØBCC	4,323,696	3741	149	527
DLØKF	3,216,400	2884	150	538
DHØDX	301,505	836	56	179
	HUNGARY			
HG6N	**9,304,300**	**6009**	**186**	**644**
	ITALY			
IO4T	**1,810,440**	**2662**	**108**	**329**
	MALTA			
9H3WW	**2,881,872**	**4258**	**122**	**382**
	POLAND			
SN3U	**2,177,666**	**2173**	**148**	**498**
	SWEDEN			
SKØTM	1,632	29	8	24
	UKRAINE			
UR8LV	**2,628,900**	**2550**	**141**	**494**

OCEANIA

	EASTERN KIRIBATI			
T32WW	**8,787,582**	**7193**	**154**	**307**

SOUTH AMERICA

	BRAZIL			
PX2A	**3,651,180**	**3472**	**103**	**287**
	NETHERLANDS ANTILLES			
PJ2T	**24,843,554**	**11083**	**187**	**615**
	TRINIDAD & TOBAGO			
9Y4ZC	**11,839,917**	**6577**	**159**	**508**

MULTI-OPERATOR MULTI-TRANSMITTER

NORTH AMERICA

	UNITED STATES			
KC1XX	**23,164,636**	**9549**	**199**	**714**
K3LR	**19,848,015**	**8216**	**202**	**707**
W3LPL	**18,887,778**	**8364**	**195**	**692**
K9NS	**17,067,984**	**7687**	**200**	**676**
K7GM/4	**13,885,675**	**7213**	**170**	**605**
K1TTT	**13,334,020**	**6380**	**179**	**641**
W2FU	**12,345,137**	**6285**	**177**	**614**
KB1H	12,218,037	6105	170	601
K1RX	11,826,717	6017	168	609
W1CW	10,552,334	5532	177	602
K2LE	8,777,496	4651	168	560
K5GO	**8,446,664**	**4608**	**187**	**615**
WØAIH/9	7,992,270	4448	176	583
W3PP	7,812,693	4253	160	569
W8AV	7,434,464	3808	171	587
N6AW	**5,730,340**	**3419**	**172**	**499**
K3II	4,364,920	2449	152	528
K2RD/6	2,757,443	1721	159	452
	CANADA			
VE3QDR	121,072	433	58	130

AFRICA

	NIGER			
5U5Z	**36,288,373**	**16309**	**182**	**621**

ASIA

	ASIATIC RUSSIA			
RZ9WXX	**686,504**	**930**	**68**	**260**
	JAPAN			
JA5BJC	**12,169,036**	**6127**	**193**	**579**
JA3YBK	**11,979,124**	**6262**	**192**	**580**
JE1ZWT	7,879,755	5127	181	482

EUROPE

	ALAND ISLANDS			
OHØZ	**20,411,160**	**11909**	**207**	**733**
	ALBANIA			
ZA1A	**21,063,690**	**14271**	**187**	**662**
	BELARUS			
EU7ZZ	**443,289**	**1210**	**79**	**224**
	BULGARIA			
LZ9W	**13,441,101**	**9080**	**191**	**676**
	CROATIA			
9A1A	**20,841,912**	**12249**	**204**	**732**
	CZECH REPUBLIC			
OL5T	**8,508,551**	**6176**	**179**	**620**
OK7K	127,347	406	61	166
	DENMARK			
OZ5W	**5,978,711**	**4312**	**169**	**582**
OZØXX	3,769,870	4053	147	464
	FINLAND			
OH2K	**1,125,824**	**1547**	**89**	**303**
	GERMANY			
DFØHQ	**19,013,850**	**10984**	**198**	**732**
	GREECE			
SX1A	**704,479**	**1577**	**91**	**298**
	KALININGRAD			
RW2F	**17,720,640**	**10372**	**204**	**741**
	LITHUANIA			
LY7A	**9,712,792**	**7401**	**179**	**617**
	SCOTLAND			
GM5A	**14,179,513**	**9843**	**188**	**671**
	UKRAINE			
UTØAZA	**2,113,984**	**2970**	**116**	**377**
UV7M	1,092,500	2115	104	333

OCEANIA

	NEW ZEALAND			
ZL6QH	**13,378,808**	**7644**	**168**	**464**

SOUTH AMERICA

	BRAZIL			
PT5A	**24,959,748**	**11107**	**196**	**688**
	GALAPAGOS ISLANDS			
HC8N	**42,781,344**	**16345**	**212**	**736**

CHECK LOGS

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- V+U/V+V/U+U operation
- V+U full duplex • Cross Band repeater function
- 50W 2M 35W UHF
- 1000+ Memory channels
- WIRES ready

Call Now For Low Pricing!

VX-5R/VX-5RS

50/2M/440HT

- Wideband RX • 6M-2M-440TX
- 5W output • Li-Ion Battery
- 220 mems, opt. barometer unit
- Alpha Numeric Display
- CTCSS/DCS built-in

NEW Low Price!

VX-150

2M Handheld

- Direct Keypad Entry
- 5w output
- 209 memories
- Ultra Rugged

Call Now For Special Pricing!

NEW!

FT-8900R Quadband Transceiver

- 10M/6M/2M/70CM • Wires capable
- 800+ memories • Built-in CTCSS/DCS
- Remotable w/optional YSK-8900

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144/430 MHz
FM DUAL BAND

Designed for the rigors of outdoor use, the FT-60R 144/430 MHz FM Hand-Held includes new Enhanced Paging & Code Squelch (EPCS) and Emergency Automatic Identification (EAI) systems that are ideal for Search-and-Rescue operations. Wide receiver coverage, commercial-grade audio quality, and the most flexible CTCSS and DCS features on the market make the FT-60R the expert's choice for Dual-Band communications!

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YAESU RUGGED HANDHELD SERIES

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5 W Ultra-Rugged Magnesium Case
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50/144/430 MHz
FM TRIPLE BAND

5 W Heavy Duty Aluminum Diecast Case
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144/430 MHz
FM DUAL BAND

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144/430 MHz FM
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FT-60R

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IC-7800

The Ultimate HF!

Multiple Meter Readouts See the latest in meter technology with the '7800's virtual meter system. These digital meters are visually superior to and of a higher performance than analog. Don't believe it? Log on to www.icomamerica.com/7800 and see for yourself!

Multiple Spectrum Displays You can select a standard spectrum display either centered on your operating frequency or a fixed range to view the band! Choose how you want to SEE the band, and then tune to what signals you see. (Photo shows the fixed range spectrum display.)

CF Card Slot The ultimate way to "take your rig with you". Just pull your CF card from your '7800, slide it into another '7800, and you now have your rig!

Triple Band Stack Registers Memorizes the last 3 used frequencies – quick recall for band hopping, provides the ultimate in multi-mode flexibility.

DUAL RECEIVER CONTROLS

Digital Voice Recorder Controls Simple record and play controls for the internal DVR. Great for quick recording and playback of a call, great for reducing the number of broken calls in your log.

Dual VFO Tuning Knobs Independent tuning knobs for each receiver. There's no mistake about which receiver you are adjusting, as the size difference allows for "no-look" operation!

DUAL RECEIVER CONTROLS

Gentlemen, start your engines. *All four of them!*

Power your way to front of the pack with Icom's new IC-7800. Cutting edge digital meets the best of world class analog, resulting in an amazing 110dB of receiver dynamic range and a *+40dBm IP3 in the HF bands!* But that's not all. The '7800 has two identical, independent receiver circuits. Receive two different bands simultaneously on different antennas, with no adverse effects from one receiver to the other – take your band hopping and contesting to the next level! There are four 32-bit floating point DSP units with 24-bit AD/DA converters, one each for the main RX, second RX, TX, and spectrum scope, to accelerate data processing to whiplash speeds! Newly designed power amplifiers provide a powerful 200W of output power at full duty cycle and low transmit IMD. So what are you waiting for? Make your move. See your authorized Icom dealer!

Dual Receive Controls Separate key receiver controls are available for each receiver. Controls for volume, RF gain, and DSP controls, the '7800 also has independent controls for the Digital Twin PassBand tuning as well as the 70 dB Manual Notch filters. Whether in a contest, or just hopping around the bands, easy access to receiver controls such as volume, RF gain, and AGC adjustments are at your fingertips.

Dual Digital Twin PassBand Tuning Only Icom brings you Digital Twin PassBand tuning. Adjustments can be made for each receiver without affecting the other receiver.

Independent Digi-Sel Controls Incorporated into the IC-7800 is a newly designed digital pre-selector, with separate controls for each receiver.

Independent Auto Tune Automatically zero beat your CW or AM carrier signals. The '7800 makes sure you're right on the proper frequency for these modes. Each receiver has a separate control.

Independent AGC Settings Multiple AGC settings for each receiver. On-the-fly adjustment for either preset AGC settings, or a completely variable AGC control.

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